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EDITORIAL

THE SECOND IMPERIAL MYCOLOGICAL CONFERENCE 1929

AT the Conference of Mycologists of the British Empire held in London in September, 1929, a number of items of interest to agriculturists in Ceylon was discussed and resolutions were adopted which may have far-reaching results. One of the subjects discussed was the question of the relative importance of the various fungi concerned in the causation of root disease of economic crops in tropical and sub-tropical regions, a subject which has achieved some prominence in Ceylon within recent years. The report of the discussion, which is reprinted in this number, indicates the opinions of Empire mycologists who have come into direct contact with the problem. Two points arise from the discussion: first, that the general consensus of opinion indicates that *Rhizoctonia bataticola* under certain conditions, particularly under conditions which are unfavourable to the normal growth of the host plant, may prove parasitic on the roots of economic crop plants, and second, that the majority of the speakers indicated their conviction that certain other fungi, of which *Fomes lignosus* and *Rosellinia arcuata* are well-known in this colony, are parasitic. The ventilation of opinions in this manner has brought us considerably nearer an understanding of the problem and it is apparent that, while further work is necessary completely to elucidate the problem, differences of thought and opinion which were more apparent than real have been to a great extent overcome.

Of the other subjects discussed at the Conference several dealt directly or indirectly with plant protection services within the Empire, particularly in connection with quarantine stations, import regulations and other measures to protect the plants in

plants which serve as centres of infection for neighbouring healthy stools. Plants infected with bunchy top disease either produce no fruit or, as sometimes occurs when plants become infected at a late stage, may produce bunches which are abnormal and of little value. It is obvious therefore that the early removal of infected plants will entail no loss of crop. Periodical inspection of plantain areas and the eradication of stools containing plants showing symptoms of bunchy top disease will reduce greatly the incidence of the disease. Immediate destruction by fire is the most satisfactory method of disposal of infected plants but this is not always practicable and the complete burial of infected plants liberally sprinkled with lime is suggested as an alternative method.

From information recently received from the Director of Fruit Culture, Brisbane, it would appear that the only means by which the disease can be eradicated completely are the destruction of all plantain material and the total cessation of plantain growing in areas in which the disease occurs for a long period (eighteen months is suggested). This would appear to be somewhat drastic and it is suggested that rigorous treatment on the lines indicated above would lead to a control sufficiently efficient for practical purposes in Ceylon.

(b) *Anthracnose of Immature Fruits.*—In wet weather plantain bunches are often affected by a disease which makes its appearance soon after the fruit has set. The extent of the infection varies under different conditions but the accompanying illustration shows a typical diseased bunch. Infection is usually found to take place in the young 'finger' from the distal end possibly starting through the flower. The infected finger begins to turn black and shrivel from the distal end and as infection progresses the whole finger turns black and shrivels. The attack may affect the whole bunch but is found more commonly to be restricted to one or two 'hands' only.

The disease is caused by the fungus *Gloeosporium (Glomerella) Musarum* and spore-masses or acervuli of the fungus can be seen on the small shrivelled fruits. They are moist and bright pink when fresh, turning into a dull light pink after some time.

In India the disease has been controlled satisfactorily by spraying. At the beginning of the wet season developing fruits were sprayed with Burgundy mixture and the spraying was repeated once a month until bunches were picked. There appears to be no reason why Bordeaux mixture or a lime-sulphur spray should not be used with equal success. In addition to spraying, other precautions are necessary for checking the disease. When all the 'hands' are opened, the fruit stalk should be cut off as far back as the last 'hand,' in order not to have any

Photo by Anthracnose of plantains. *L. S. Bertus.*

Photo by Dodder on Vigna. *L. S. Bertus.*

part of the fruit stalk on which the fungus may live saprophytically. All diseased fruits should be removed and burned immediately they are seen. Attempts should also be made to improve general sanitation by the removal and destruction of plant debris.

2. *Diseases of Cover Crops* : (a) *Mildew of Centrosema pubescens*.—A mildew of *Centrosema pubescens* caused by *Oidium* sp. was collected at Peradeniya. The morphological characters of the fungus were similar to those of *Oidium Heveæ* and it is possible that the pathogens are identical. Since the perfect stage of *Oidium* has never been found in Ceylon it is extremely difficult to ascertain definitely the relationships between the various species and this difficulty is enchanced by failure of artificial inoculations to reproduce the disease. It is unlikely that the presence of the mildew on the cover crop, even if it were identical with that which caused a disease of the rubber under which it was grown, would affect materially the incidence of the disease on the rubber. On the other hnad, the presence of the mildew on the rubber, in the same circumstances, might affect the growth of the cover crop by offering an extensive source of infection.

(b) *Dodder on Vigna*.—The appearance of dodder (*Cuscuta chinensis*) on Vigna is worthy of mention. In a new rubber clearing in which there was a thick growth of Vigna, dodder was seen to have spread from *Mikania scandens* on the boundary and to be parasitizing the Vigna. Microscopical examination in the laboratory demonstrated that the parasite had penetrated the stems of the cover crops and was absorbing food therefrom in the usual manner, by means of haustoria. The effect of the parasite on the cover crop was not very marked, the level of attacked plants being somewhat below that of the surrounding healthy plants but of the normal green colour. An example of a typical affected area is shown in the accompanying illustration.

Although the damage caused by dodder on Vigna did not appear to be very great in the instance cited, it would be inadvisable to leave it untouched and if affected plants are collected and burned as soon as the parasite is observed control should be simple.

(c) *Rhizoctonia* (*Corticium*) *Solani*.—On most rubber estates on which Vigna (*Dolichos Hosei*) is grown as a cover crop the disease caused by *Rhizoctonia* (*Corticium*) *Solani* is of common occurrence. The appearance of the disease in more or less circular patches which increase in size is well known and needs no description. The disease is seasonal, the fungus being active only during wet weather when conditions are favourable for its growth, while its activity ceases with the advent of dry weather. After a spell of dry weather new growth of Vigna

sometimes takes place within diseased patches, but with the advent of wet conditions the sclerotia of the fungus germinate and this new growth is in turn attacked and killed. The inactivity of the fungus during dry weather sometimes leads to lack of appreciation of the importance of the disease, which should be treated as soon as possible after it appears. All diseased Vigna, together with a belt of three feet of apparently healthy plants from the periphery of the patch, should be burned together within the patch.

In this connection the occurrence of a disease of young bud shoots of *Hevea* is not without interest. Vigna was used to protect young bud-shoots from the sun. When the shoots had grown to a height of about one foot some of them died back. Examination showed that they had been attacked and killed at the base of the shoot just above the bud patch by *Rhizoctonia Solani*. It would appear that the fungus had spread from the Vigna, although the latter had not shown signs of disease when used.

Dunbaria Heynei, an indigenous legume which is being used with success as a cover crop in some areas, has been found to be attacked by *Rhizoctonia Solani*. The effect of the disease is similar to that on Vigna and similar control measures are advocated.

3. *Vermicularia Capsici Syd.*—A serious disease of chillies may occur if wet weather conditions set in after the fruit has set. The disease is known as *kaludanda rogaya* (black stem disease) by the Sinhalese cultivators and the name describes the symptoms. Infection may occur in the flowers or young fruits and extend backwards into the stem. The whole branch and finally the whole plant may become withered and diseased. The fungus which causes the disease is *Vermicularia Capsici* and the fructifications, which are minute black spore-masses or sporodochia, are borne copiously on diseased fruits and stems. Inoculations carried out with pure cultures of the fungus have proved that the fungus is capable of causing the disease.

In India the disease has been controlled by spraying with Bordeaux mixture. A single spraying has been shown to carry the crop through the critical period of a few weeks when rapid spread of the disease takes place.

4. *Mosaic Disease of Tobacco.*—The name mosaic disease is given to a disease of tobacco found apparently in every tobacco-growing country in the world and is derived from the mosaic-like mottling of diseased leaves. The disease occurs in Ceylon in the tobacco-growing districts in the North-Western, the Western and the Southern Provinces and, less commonly, in the Jaffna Peninsula.

The most characteristic symptom is a patch-work appearance of lighter and darker green areas on the leaf. The lighter areas lie between the lateral veins of the leaf, seldom reaching up to the latter. The darker areas may be of the normal green or of a darker green than the normal and are thicker than normal. The growth of the leaves is irregular, that of the lighter areas being relatively greater than that of the darker, with the result that the light areas are often bulged on the upper surface and hollow below, giving a crinkled appearance. The disease is most obvious in the younger leaves which are often dwarfed and considerably crinkled.

The cause of the disease is obscure and has been the subject of extensive investigations in the United States and elsewhere. It falls into that class of diseases known as virus diseases in which the causal agent does not fall into the category of any known form of life but, at the same time, has characteristics similar to those of other organisms. A minute drop of the sap expressed from a diseased plant when inoculated into a healthy plant causes the disease. This transference of contagious sap may take place under field conditions through the agency of man or insects. It has been shown that the mere rubbing of sap from an infected plant into a healthy leaf can cause the disease.

The prevention of the disease would appear to be impossible. In areas in which the disease occurs attempts should be made to reduce its conveyance. Seed from healthy plants only should be used. In operations such as topping, plants showing signs of the disease should not be topped at the same time as healthy plants. It has been shown in America that thorough washing of the hands after handling infected plants will prevent the spread of the disease by the hands. In transplanting, seedlings displaying symptoms of the disease should not be used. All plant débris which might prove to be a starting place for infection should be cleared away before planting.

Other solanaceous plants such as potatoes, tomatoes and chillies as well as wild plants of the same family are capable of spreading the disease.

5. *Citrus Canker.*—Citrus canker (*Pseudomonas Citri*) is a very troublesome disease of all citrus trees at low and medium elevations. It produces yellow brown corky excrescences on leaves and green stems which may develop into cankers and cause some defoliation. Infection is found commonly to follow attack by the leaf-mining caterpillar, *Phyllocnistis citrella.* Satisfactory control of this disease and of mildew (*Oidium tingitaninum*) has been obtained by spraying weekly with a 3 per cent. solution of *Sulfinette*, a proprietary lime-sulphur spraying fluid.

A SOIL EROSION INVESTIGATION

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AT the request of the Committee on Soil Erosion an investigation of a preliminary nature to determine the amounts of silt carried in the water of a Ceylon river at different seasons of the year was begun in August, 1929. The site chosen for the investigation was that part of the Mahaweli Ganga at Gangoruwa between the Experiment Station and the Royal Botanic Gardens, Peradeniya, where the river takes a bend. This site was chosen because of the facilities it afforded for the taking of samples, a boat and a ferry and labour being available at all times.

The breadth of the river at this point varied considerably during the period of the investigation, the range of variation being from about 200 to 300 feet. The depth of the river also varied at different periods and at different points of its cross-section from 2 to 20 feet, and to considerably greater depths during times of flood. The average depth during a year over the whole breadth of the river at this point may be considered to be about 4 feet. On the few occasions that depth soundings were taken, a plumb-line was used for the purpose.

It was originally intended to obtain samples of the water at the lower depths by a modification of the sampling apparatus used by Prof. W. N. Rae of the University College, Colombo, in his investigation on Colombo lake and harbour water, but owing to the great difficulty of keeping the boat steady while sampling, only surface and two feet depth samples were made and these by hand. The opportunity is taken to thank Prof. Rae for his valuable assistance in this matter. If any further investigations are to be carried out on this subject, the modified Rae method of sampling at lower depths will be adopted.

For the determination of the velocity of the water it was proposed to use a current meter, but again, owing to the difficulty of keeping the boat steady and as the velocity registered by the meter was reported to be very apt to exaggerate the true velocity of the stream, these determinations were made by means of a float. The velocities varied from 1 to 3 feet per second, with an average of about 2·5 feet per second. This velocity range may appear somewhat low, but as determinations could not be conveniently made at times of flood, it may be considered fairly representative.

In the table below are shown the results of the total solid determinations on the surface and two feet depth samples respectively, the surface velocity measurements, and the rainfall in the catchment areas on the two days prior to sampling and on the date of sampling. For these rainfall figures thanks are due to the Superintendent of the Colombo Observatory.

Date of sampling.	Locality of sample feet.	Depth of Locality.	Velocity. feet per second.	Parts per million.	Nature of sample.	Total Rainfall in catchment area. (inches).
8-8-29	45 from R.B.G.	1 ft. 6 in.	2·0	69·0	Surface	6th-1·35; 7th-3·80; 8th-3·57.
17-9-29	35 ,, ,,	2 ft. 4 in.	2·4	101·0	Surface	15th-25·80; 16th-10·94; 17th-7·58.
17-9-29	35 ,, ,,	2 ft. 4 in.	2·4	94·2	2 ft. depth	
17-9-29	75 ,, E.S.P.	6 ft. 0 in.	3·0	97·2	Surface	
2-10-29	50 ,, R.B.G.	2 ft. 3 in.	2·4	91·4	Surface	30th-13·54; 1st-12·07; 2nd-6·32.
2-10-29	50 ,, ,,	2 ft. 3 in.	2·4	94·2	2 ft. depth	
2-10-29	50 ,, E.S.P.	6 ft. 9 in.	2·7	91·8	Surface	
30-10-29	50 ,, R.B.G.	2 ft. 1 in.	2·0	153·0	Surface	28th-6·69; 29th-10·32; 30th-7·94.
30-10-29	50 ,, ,,	2 ft. 1 in.	2·0	158·0	2 ft. depth	
30-10-29	50 ,, E.S.P.	4 ft. 2 in.	2·4	187·4	Surface	
16-11-29	25 ,, R.G.B.	4 ft. 2 in.	3·0	350·6	Surface	14th-7·68; 15th-26·73; 16th-15·89.
16-11-29	25 ,, ,,	4 ft. 2 in.	3·0	371·0	2 ft. depth	
16-11-29	10 ,, E.S.P.	10 ft. 3 in.	1·7	331·6	Surface	
5-12-29	25 ,, R.B.G.	2 ft. 11 in.	2·5	286·0	Surface	3rd-5·75; 4th-34·49; 5th-8·01.
5-12-29	25 ,, ,,	2 ft. 11 in.	2·5	321·2	2 ft. depth	
5-12-29	15 ,, E.S.P.	11 ft. 6 in.	1·8	327·2	Surface	
9-1-30	50 ,, R.B.G.	3 ft. 6 in.	2·4	91·2	Surface	7/8th-7·10; 8/9th-1·40; 9/10th-1·41.
9-1-30	50 ,, ,,	3 ft. 6 in.	2·4	92·6	2 ft. depth	
9-1-30	10 ,, E.S.P.	9 ft. 0 in.	1·5	96·0	Surface	
17-1-30	75 ,, R.B.G.	3 ft. 9 in.	3·0	240·0	Surface	15/16th-2·66; 16/17th-17·44; 17/18th-12·43.
17-1-30	75 ,, ,,	3 ft. 9 in.	3·0	246·2	2 ft. depth	
17-1-30	50 ,, E.S.P.	5 ft. 0 in.	2·7	214·0	Surface	
28-1-30	50 ,, R.B.G.	2 ft. 2 in.	1·2	57·8	Surface	26/27th-nil; 27/28th-nil; 28/29th-·03.
28-1-30	50 ,, ,,	2 ft. 2 in.	1·2	57·8	2 ft. depth	
28-1-30	10 ,, E.S.P.	4 ft. 10 in.	3·0	69·4	Surface	

An examination of the table will show that the amounts of silt vary from 57·8 or nearly 60 to 370 parts per million of water by weight up to a depth of two feet. This works out at from ·6 to 3·7 lb. of silt in 1000 gallons of water. The data obtained clearly indicate that there is a close parallelism between the rainfall in the catchment area up-country a day or two prior to sampling, and the amount of silt in the river water at Gangoruwa at the date of sampling. In other words, the greater the rainfall in this area, the greater is the amount of soil erosion and hence the larger the quantities of silt found in the river water. It will also be noted that the amounts of silt vary appreciably at different points of the cross-section of the river, as also do the velocities. As is to be expected, the amounts of silt in the water increase with depth. It has also been observed that, owing to the comparatively low velocity of the river at this point except after periods of continuous steady rain, the amount of silt in the water falls to a comparatively low level a day or two after the cessation of the rains.

The velocity of the water varies from 1·5 to 3·0 feet per second, with an average of about 2·5 feet per second. The depth of the river at the periods of sampling varied from 1 ft. 6 in. to 11 ft. 6 in. Reckoning on an average velocity of 2·5 per second, an average depth of 4 feet and a breadth of 250 feet at this point of the river, the average amount of water flowing at this point will be 2,500 c. ft. per second or over 15,000 gallons per second and the amount of silt carried in the water at this point of the river will therefore vary from 9·4 to 58 lb. per second or from about 130,000 to 820,000 tons per annum. These figures, it will be understood, will vary considerably each year for the different rivers at different periods of the year, and for the same river at different points in its course, but they give an idea as to the vast amounts of valuable silt that may be lost by erosion from the soils of the hill country of Ceylon.

In order to obtain a rough estimate of the amounts of silt actually lost from Ceylon soils, it will be necessary to carry out an investigation such as this over the entire period of at least one year at the mouth of each of the rivers of the island which have their sources in the wet hilly districts. An investigation such as this could include in its scope the determination of the amounts of plant fertilising constituents contained in the water and in the suspended matter of Ceylon rivers. Such an investigation will repay any labour, time and money spent on it, as it would be possible by this means to ascertain whether the universal adoption of the measures recommended for the prevention of soil erosion is achieving the object aimed at, viz., the prevention of the washing away of valuable soil constituents from the country into the sea.

TAPPING TO DEATH: A WARNING

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THE question of the rejuvenation of old rubber is now engaging the serious attention of some Ceylon estates. Before cutting out the old rubber preparatory to replanting with superior material the estate naturally wishes to obtain the maximum yield in the time available.

An experiment in the rejuvenation of old rubber was laid down on the Experiment Station, Peradeniya in 1929, and was fully described in the progress report of the station for September and October, 1929, which was published in *The Tropical Agriculturist* of December of that year. The area used in the experiment is divided into four plots. In the first three plots the trees are tapped daily to the wood on two cuts on the half circumference one above the other. The only difference is in the bark consumption; in plot 1 the bark consumption is arranged to allow all the available bark to be used up in one year, in plot 2 in two years, and in plot 3 in three years. In plot 4 the bark consumption is arranged for the bark to be used up in four years, but in this plot tapping is done daily in alternate months and with close tapping, but not to the wood. Such a system has been shown by another experiment to produce approximately the same yield as continuous alternate day tapping, but is probably rather more conducive to brown bast.

It soon became apparent that a number of cuts in plots 1, 2 and 3 were going dry. When this occurred a fresh cut (not quite to the wood to avoid ringing the tree) was made on the other side of the tree. The experiment started on September 1st, 1929, and four months later the position was as follows:

	Percentage of cuts gone dry
Plot 1	23·5
Plot 2	20·0
Plot 3	23·2
Plot 4	1·2

Out of a total of 159 cuts gone dry, 71 were upper cuts and 88 lower cuts. This fact appears to counter the suggestion that the upper cuts have gone dry because of the severing of communications by the lower cut. Doubts have also been cast on the actual presence of brown bast in these cuts. This point seems immaterial. If the cuts are dry they are useless, whatever the cause.

For the first four months of the experiment the yields per tree have been as follows:

	lb.	oz.
Plot 1	6	14
Plot 2	7	4
Plot 3	7	11
Plot 4	6	5

In plot 4 the cuts receive only half the number of tappings that those in plots 1, 2 and 3 receive, but only one cut has gone dry and the yield per tree is very little below that of the other three plots.

It is necessary to consider the two other factors involved, besides that of frequency of tapping, viz., bark consumption, and whether the trees are tapped to the wood or not. There appears to be little evidence to show that the difference in the amount of bark consumed in plots 1, 2 and 3 has affected either the percentage of cuts that have gone dry or the yield.

As regards tapping to the wood there is other evidence on the Experiment Station. A hundred trees in another block were tapped to the wood on alternate days for a period of one year. The average yield of the trees showed an increase of approximately 25 per cent. over the average of the three previous years and the brown bast incidence was negligible. It would therefore appear that tapping to the wood does not of itself cause brown bast.

In another experiment carried out on the station two cuts *one on each side of the tree* were tapped daily, not to the wood. In this case the incidence of brown bast (or drying up of cuts) was as heavy as in the present instance. This tends to show that the fact of the two cuts being one above the other does not materially affect the issue. The cause then of this rapid and serious drying up of cuts can only be ascribed to daily tapping, and this brief note is written as a warning to those undertaking similar work. There is every likelihood that the yields of plots 1, 2 and 3 will progressively decline as more and more cuts go dry while there is no reason to suppose that the yield of plot 4 will not be maintained.

It is doubtful therefore if daily tapping can be economically employed in tapping to death except for a very short period.

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THE specimen of *Phaius Wallichii* represented in the accompanying photograph is one of the few terrestrial orchids that decorate our hill country pastures and forests.

Owing to its easy culture, pretty foliage and lasting flowers it occupies a well-merited and prominent place either in a room or verandah as a decorative plant. *Phaius Wallichii* is indigenous to Ceylon, India, Burma and Malaya and has become a favourite pot plant owing to its striking appearance and its large lanceolate leaves of 2 to 3 ft. long. The flowers are borne on a long scape which arises from the side of the pseudo-bulbs. The flowers are 3 to 4 inches crosswise and they last for over six weeks. The sepals and petals are lance-shaped and of a creamy white colour on the outside and orange-yellow flushed with reddish-purple on the inner side. The lip is white and more or less suffused with pink except in the throat where it is of a brownish-purple. It is pointed at the apex and has a crisp margin.

The flowers appear twice a year and last for over six weeks. The period of flowering varies at different altitudes.

Culture.—The propagation of the plant is easily effected by the division of the rootstock or pseudo-bulbs. The stem and flower stalks of the plant may be employed for the same purpose in the form of cuttings 3 to 4 inches long, each containing at least two nodes or joints. Plants raised by the latter process take a longer period to come into bloom than plants grown from the pseudo-bulbs. The pseudo-bulb, with or without a lead, when used for planting should be cleaned of all dead roots and other decayed parts and placed about a couple of inches below the surface in a compost of equal parts of loam, leaf-mould, bits of charcoal, well-decomposed cow manure and coarse sand. The cuttings need a soil rich in humus and of a porous nature to enable them to strike. River sand and leaf-mould are useful for the purpose. In both cases, the pots in which the plants are to be grown should have good drainage and should be cleaned well. After potting the plants should be kept in shade under a tree for a few days and watered sparingly till the plants show new growth. The plants will need liberal watering both morning and afternoon during active growth and care should be taken not to wet the new shoots. During active growth, the plants prefer a warm humid atmosphere and in this state they will come into bloom in about six months.

Phaius Wallichii Lindl.

CONTRIBUTIONS FROM THE RUBBER RESEARCH SCHEME, CEYLON

THE REPLANTING AND REJUVENATION OF OLD RUBBER AREAS

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The outlook in brief.—The low market prices for crude rubber prevailing recently have shown unmistakeably to all that a number of our present estates will, in all probability, within the next decade be unable to compete with the younger properties which have been planted up with selected high-yielding material. The coming into bearing of these modern plantations will render available quantities of rubber at a price which will encourage its use in many ways at present scarcely contemplated or, at most, only experimented with. Road-making may be a case in point. It is improbable that the price of the raw material will be stabilized at any very low figure but, it seems safe to say that the opening up of high-yielding areas will very considerably reduce the average price of the commodity. Large dividends may continue to be paid, but they will be the perquisite of high-yielding estates with the resultant low cost of production. Should such a situation eventuate, our poorer estates will be faced with the choice of replanting or abandoning.

The intention of the writer is not to suggest that every estate should start replanting now but to point out some ways in which preparations can be made against the time when such action may become necessary, and naturally these remarks are intended principally for low-yielding properties with no jungle reserve.

The need for carefully thought-out experiment.—Judging from enquiries received and by the number of estates which are starting to replant small areas, the question is receiving due consideration in certain quarters. A number of so-called experiments on replanting are being started now but unfortunately with little thought to the economics of the operation. Only in a few instances, for example, has any attempt been made to realise any of the capital invested in the old trees. In the writer's opinion, the cutting out of these trees without first "bleeding them white" amounts to a breach of trust. Their

removal and replacement by high-yielding strains presents no real difficulty, and this part of the operation resembles to a large extent the opening of a new clearing. Where experiment is really required is in the method of overtapping to be adopted so that the maximum yield can be obtained from the old trees before removal. The actual costs of the operation as a whole cannot be properly estimated unless this is known. Any future programme drawn up will be based on the experience gained and the expenses incurred during these trials.

Further, most of the estates which are starting their experiments have no proved bud-wood growing on their properties. One or two years' heavy tapping before removal would allow time for the multiplication of the bud-wood required and the budding of the young plants to be put out, thus effecting a considerable saving on original outlay on planting material.

Replanting or rejuvenation.—Some distinction should be drawn between these two terms. The complete removal of all trees and subsequent replacement should be termed replanting, whereas rejuvenation of an area can be taken to mean the removal and replacement of all poor or medium trees, and the retention of the best.

Rejuvenation may prove preferable in certain cases but it is considered inadvisable to leave more than 10 per cent. of the previous stand and no tree yielding less than 10 lb. of dry rubber per annum. The retention of a larger percentage introduces competition between the old and young trees for light and ground space and may well lead to disappointment.

The present note is written on the assumption that replanting is the better method for the areas likely to be treated in the near future, and no trees other than exceptional yielders or mother-trees will be left.

Overtapping prior to removal of old trees.—On most estates there is sufficient bark of tappable thickness to permit of the tapping of a cut on both sides of the trees (on alternate days) for a period of at least two if not three years. This tapping of both cuts to the normal depth will produce at least one and a half times as much latex as the tapping of one cut. Thus in three years a yield equal to that normally obtained in four and a half years is obtained. If, during this tapping, the bottom nine inches or so of the trunk is avoided, there will remain bark sufficient for one year's heavy tapping on the highest-yielding portion of the tree. Thus the fourth year, that is the year before removal of the trees, should yield a much increased crop, and, if thick shavings are taken and subsidiary cuts put in, wherever there is bark within

reach, the yield of the fourth year can be expected to be equal to two and a half times the previous yield of the area. In four years, therefore, extra crop equivalent to the return from three normal years' tapping can be obtained, the extra revenue from which will considerably reduce the cost of the operation or, alternatively, go a certain way to compensate for loss of crop during the period when the young rubber is reaching maturity.

It is not suggested that the above scheme will prove the best but it would appear to be a suitable starting point for experiment. It may be necessary in some cases to reduce the period of overtapping to a total of three or even two years.

Table 1 gives the tapping arrangements and table 2 the expectation of crop over the period of overtapping. In these tables it is assumed that an area is being replanted on a ten-year basis, one-tenth of the area being cleared each year. The unit of yield represents the yield which would be obtained from that area under normal tapping conditions.

Table 1.

Plots	...	1	2	3	4	5	6	7	8	9	10
1930	...	x	n	n	n	n	n	n	n	n	n
1931	...	x	x	n	n	n	n	n	n	n	n
1932	...	x	x	x	n	n	n	n	n	n	n
1933	...	=	x	x	x	n	n	n	n	n	n
1934	...	0	=	x	x	x	n	n	n	n	n
1935	...		0	=	x	x	x	n	n	n	n
1936	...			0	=	x	x	x	n	n	n
1937	...				0	=	x	x	x	n	n
1938	...					0	=	x	x	x	n
1939	...						0	=	x	x	x
1940	...							0	=	x	x
1941	...								0	=	x
1942	...									0	=
1943	...										0

n = tapped normally.
x = tapped both sides to normal depth.
= = final tapping.
0 = trees cut out.

Table 2

Plots	...	1	2	3	4	5	6	7	8	9	10
1930	...	1·5	1	1	1	1	1	1	1	1	1
1931	...	1·5	1·5	1	1	1	1	1	1	1	1
1932	...	1·5	1·5	1·5	1	1	1	1	1	1	1
1933	...	2·5	1·5	1·5	1·5	1	1	1	1	1	1
1934	...		2·5	1·5	1·5	1·5	1	1	1	1	1
1935	...			2·5	1·5	1·5	1·5	1	1	1	1
1936	...				2·5	1·5	1·5	1·5	1	1	1
1937	...					2·5	1·5	1·5	1·5	1·5	1
1938	...						2·5	1·5	1·5	1·5	1
1939	...							2·5	1·5	1·5	1·5
1940	...								2·5	1·5	1·5
1941	...									2·5	1·5
1942	...										2·5

The removal of the trees.—This should be thorough, but, in the opinion of the writer, not more than Rs. 200 per acre need be spent on this item unless it is known that root disease is prevalent. Mention has been made of Rs. 450 per acre as being the minimum cost of efficient clearing but it seems inconceivable that the risk of *Fomes* infection warrants the expenditure of the extra Rs. 250 or, alternatively, it is scarcely within the bounds of possibility that necessary control measures, should *Fomes* break out, will cost an *average* of Rs. 250 an acre. Several blocks have been efficiently cleared at a cost much lower than Rs. 200 per acre.

The actual method of removal will vary with conditions and it may be carried out by the agency of elephants or monkey grubbers or by hand according to which is most convenient or least expensive. The time of removal should be just after the new year's leaf has been put on. This provides a double crop of leaf for soil enrichment purposes. This point will be mentioned again later.

Disposal of the timber.—This again will depend on conditions and situation. Where the block is adjacent to a road or canal the timber might sell on the ground at Re. 1·00 per yard before being cut up, and at least that figure should be obtainable for firewood already cut. In some instances it may be possible to obtain the services of a contractor who will remove the trees and side roots in exchange for the firewood obtained. If there is no market for firewood the timber may have to be burned on the land. In such cases burning should be localised so that the

soil is depleted of the remaining humus to as small an extent as possible. If holes or contour trenches have been cut before felling, the logs should be burned over these so that all ash is caught.

It has been suggested elsewhere (The problem of survival —replanting and supplying considerations, by G. F. S. Sutton, *India-Rubber Journal*, Oct. 12, 1929) that the timber be converted into charcoal and stored in that form for future use in suction gas engines. It is there stated that, where extensive replanting is being done, it would even pay to scrap existing power installations and put in gas engines, as this fuel is four and a half times as cheap as crude oil. From another source the suggestion emanates that the charcoal might be made into dust and the dust made into briquettes with low grade tapioca flour, in which state it will keep much longer. Such considerations are not in the sphere of the present writer but are included so that this note may be reasonably complete.

Reopening of the land.—Except on the flattest of land it is considered that some form or other of contour planting should be adopted. Also as much of the holing, trenching or silt-pitting as possible should be done before the removal of the old trees. The holes, etc. can then be at least partially filled with the leaf from the trees. None of this leaf should be burned; it is valuable for the reconditioning of the soil. Two years' leaf will be available if felling is carried out just after refoliation, and a handful of cyanamide in each hole along with the green matter will help to form a useful compost.

Where funds permit, the adoption of the Denham Till method of contour trenches is recommended. As this method of opening has been fully dealt with already in *The Tropical Agriculturist* there is little object in going into details. Considerable lengths of these trenches can be cut before the old trees are removed and they provide convenient places for the burying of any green material available.

If trenching is not to be carried out contour terracing may be possible and in this case as many as possible of the large planting holes, at least 3 ft. cube, should be cut before the felling. These will naturally follow the contours of the hill and so permit later of the cutting of the terraces, if this has not also been possible to a certain extent before clearing.

Even if neither system is possible, planting should be done on the contour so as to permit of the subsequent planting of contour hedges of some leguminous plant to stop wash. The opening of silt-pits or the building of stone terraces is also facilitated by such a procedure. In certain cases it may be possible to convert the existing drains to the lock and step or similar system.

Reconditioning of the soil, cover crops, etc.—The establishment of cover crops should be one of the first considerations. Seed should be put in just after the trees are removed, while the soil is still loose. Any Vigna torn up during felling and uprooting should be put in the planting holes.

A mixture of leguminous plants should be used so that a heavy cover is obtained without delay. As cover plants *Dolichos hosei* (Vigna), *Calopogonium mucunoides*, *Centrosema pubescens* and *Centrosema plumieri* can be all used together or a selection made. If, previously, Vigna has grown satisfactorily this may suffice alone. The above, however, are almost entirely ground covers; their chief function is to prevent wash, and the greatest need of our average soil is an increase in the humus content. This is best brought about by growing some of the taller legumes, frequently distinguished as green manures. *Tephrosia candida*, the Crotalarias, *Indigofera arrecta*, *Desmodium gyroides*, *Clitoria cajanifolia* can be used. They should be put in as contour belts. There is no reason why, for a year or two, the areas between the contour rows of young rubber should not resemble a dense " cheddy " growth of the taller legumes. Only in this way and by frequent lopping and burying of the loppings will the soil gradually resume its earlier fertility. There is no objection to growing Gliricidias or *Leucana glauca* here as well; besides providing material for burying they serve as protection from wind and as light shade.

Where the contour trenches are employed all the material from the earlier prunings can be accommodated in these as it is usual to fill up, in the first instance, only the parts which are to be occupied by plants. The intervening portions provide excellent places for cheap burying, and the material is exactly where it can be made use by the extending root systems of the young plants. The addition of a little cyanamide, or a cyanamide-phosphate mixture, to the trenches at the same time as the green matter is buried hastens decomposition and renders the material more readily available.

Wind breaks.—It is well before cutting out old rubber to study the direction of the monsoon winds and it may be necessary or advisable to leave belts of the old trees as temporary wind breaks. Such belts can be replaced if desired by Albizzias or Grevilleas but these take some time to grow, and it is in the earlier years that the need of shelter is felt. If Albizzias are not left for more than five or six years there should be little danger of propagation of root disease after their removal. The growing of Albizzias as permament wind breaks is not advised; sooner or later they must be removed and this is a costly operation and attended with considerable danger to the neighbouring rubber trees.

Replanting material.—The use of proved clones of budded rubber is advised where a large area is being replanted. Real selected seed is not condemned, but this is very scarce in Ceylon, and is likely to remain so for some time.

Apart, however, from proved clones bud-wood may be used from local high-yielders, but the use of such material must be considered experimental, and no large area should be planted up from any one tree. Fifty to one hundred plants are sufficient to bud from any such source. The planting up of this quantity is, however, strongly advised, as it is only in this way that new high-yielding clones will be discovered.

It is the opinion of the writer that, whatever the material used for replanting, each clone should be kept separate and not mixed up, even systematically. The reason for this is that, in all probability, different clones will have to be tapped in different ways to give of their best. Clone A may respond well on alternate-day tapping, Clone B probably can only stand third-day tapping. Again, Clone C may respond best when tapped at a height of 5 feet in all probability necessitating the return to use of the old draw knife. It will be impossible to get the best out of all members of a mixed population by a single method of tapping.

As only very small blocks are to be planted up with unproved material, the planting up of a mixture of clones with a view to future thinning out need not, it is thought, be considered.

Bud-wood nurseries.—The laying down of bud-wood nurseries is fully described in a booklet entitled *The budding of rubber* which will be issued at an early date by the Rubber Research Scheme, and this should be consulted. It is strongly advised, however, that every estate, or at least every company, should possess a bud-wood nursery containing material from all the best proved clones available.

Supply nurseries.—The writer's opinion is that all budding is best done in the nursery, with subsequent planting out while the buds are still in the dormant state. Budding can be carried out practically throughout the year in a nursery, so that material is available to take advantage of good planting weather. Full details as to laying down nurseries, etc. are given in the booklet mentioned in the last paragraph.

A tentative programme.—It is assumed that the area to be replanted is yielding 300 lb. per acre and that by replanting a yield of 1000 lb. per acre can be obtained. The programme is spread over ten years and for reasons of simplicity it is assumed that 10 acres are being treated at the rate of one acre a year. This facilitates easy calculation for larger areas.

Should it be found that four years' heavy tapping is too much, calculations similar to those given below can be made to show expectation of crop, etc.

Time-table

The one-acre blocks are labelled ABC.....J.

Year ...	Tapping both sides	Final tapping	Cut out	Bud-wood nursery	Plant supply nursery	Budding	Plant out
1930 ...	A			Plant			
1931 ...	AB			Bud	For A		
1932 ...	ABC			Bud	,, B		
1933 ...	BCD	A			,, C	For A	
1934 ...	CDE	B	A		,, D	,, B	A
1935 ...	DEF	C	B		,, E	,, C	B
1936 ...	EFG	D	C		,, F	,, D	C
1937 ...	FGH	E	D		,, G	,, E	D
1938 ...	GHI	F	E		,, H	,, F	E
1939 ...	HIJ	G	F		,, I	,, G	F
1940 ...	IJ	H	G		,, J	,, H	G
1941 ...	J	I	H			,, I	H
1942 ...		J	I			,, J	I
1943 ...			J				J

Expectation of crop

Plot ...	A	B	C	D	E	F	G	H	I	J	Total	
1930 ...	450	300	300	300	300	300	300	300	300	300	3150	
1931 ...	450	450	300	300	300	300	300	300	300	300	3300	
1932 ...	450	450	450	300	300	300	300	300	300	300	3450	
1933 ...	750	450	450	450	300	300	300	300	300	300	3900	
1934 ...		750	450	450	450	300	300	300	300	300	3600	
1935 ...			750	450	450	450	300	300	300	300	3300	
1936 ...				750	450	450	450	300	300	300	3300	
1937 ...					750	450	450	450	300	300	2700	
1938 ...						750	450	450	450	300	2400	
1939 ...							750	450	450	450	2100	
1940 ...								750	450	450	1650	
1941 ...	700								750	450	1900	
1942 ...	850	700								750	2300	
1943 ...	1000	850	700								2550	39300
1944 ...	1000	1000	850	700							3550	
1945 ...	1000	1000	1000	850	700						4550	
1946 ...	1000	1000	1000	1000	850	700					5550	
1947 ...	1000	1000	1000	1000	1000	850	700				6550	
1948 ...	1000	1000	1000	1000	1000	1000	850	700			7550	
1949 ...	1000	1000	1000	1000	1000	1000	1000	850	700		8550	
1950 ...	1000	1000	1000	1000	1000	1000	1000	1000	850	700	9550	
1951 ...	1000	1000	1000	1000	1000	1000	1000	1000	1000	850	9850	
1952 ...	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	10000	105000

Expectation of Crop : Analysis.—The crop obtained from the 10 acres, from the start of the experiment up to the time when the area is again yielding an average of 300 lb. per acre (up to fourteenth year), is 39,300 lb. This is in place of 42,000 lb. which would be expected if nothing had been done. The loss is 2,700 lb. on 10 acres in fourteen years or an average drop of 19·3 lb. per acre per annum. Such a drop might quite easily have been encountered quite apart from replanting considerations, owing to loss of trees from disease, etc.

If taken over the whole period of twenty-three years depicted in the above table, 105,000 lb. have been obtained or an average of 156·5 lb. per acre more than would normally have been expected.

Considering the period from the fifteenth to the twenty-third year 65,700 lb. are obtained instead of 27,000 lb., an average increase of 430 lb. per acre per annum.

Note.—Should it be considered that the study of growth on replanted land is more urgent than allowed for in the above scheme there is no reason why the over-tapping should not be arranged to allow of the replanting of the first block after two years. Two years is considered the minimum time in which the average Ceylon estate at the present time could multiply sufficient bud-wood and have ready budded material for the replanting. Alternatively, a small subsidiary block may be so tapped as to be ready for replanting in two years' time. This would afford some information on growth and would not interfere with the main experiment.

A DISEASE OF YOUNG BUD-SHOOTS CAUSED BY PHYTOPHTHORA PALMIVORA, BUTLER

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IN the Rubber Research Scheme 3rd Quarterly Circular for 1929 attention was drawn to a new disease of young shoots of bud-grafted *Hevea* caused by a species of *Phytophthora*. The following is a more comprehensive account of this disease and the fungus causing it.

Symptoms and Effects.—The symptoms of the disease are best described from inoculations made on young green shoots of nursery seedlings. In the first series of experiments twelve plants were selected and treated as follows:

3 unwounded, inoculated.
3 wounded, inoculated.
3 unwounded, control.
3 wounded, control.

The inoculum consisted of a vigorous growth of the fungus on Quaker Oats agar medium and was applied inside a cotton wool bandage moistened with sterile water, about 6 inches below the extremity of the shoot. The control plants were treated similarly except that the bandages contained only the sterile medium. The wounds were made by removing the epidermis and outer cortical cells over a small area with a sterilised knife. The conditions could of necessity not be kept strictly sterile, and the bandages were subsequently kept moist for a few days with ordinary water.

After two days the inoculated shoots showed blackish, watery-looking, vertical streaks. Six days after the inoculations had been made these streaks had merged into black sunken areas 1-2 inches in length, on the surface of which sporangiophores and sporangia of *Phytophthora* could be seen with a microscope. The disease had progressed slightly further on the wounded than on the unwounded shoots, but in other respects the symptoms were identical. At this stage there was no sign of wilting of any of the shoots. Subsequently the disease spread up and down the shoots and secondary fungi gained entrance. All the control shoots remained healthy.

Plate I. Plate II.

The progress of the disease is probably dependent in large measure on the weather conditions. When the inoculation experiments described above were carried out the weather was exceptionally dry, and after 1 month the disease, having killed back the shoots for a distance of about 1 foot from the tip, was checked, and new shoots developed below the affected parts. In subsequent inoculations made in wetter weather the shoots were quickly killed back to the extent of the most recent growth increment, and in some cases the leaves had wilted after 3 or 4 days. In no case has the disease been observed to kill the entire plant, but it must be borne in mind that all inoculations have been made on seedlings about 2 years old, and that if the disease attacks a very young bud-shoot the latter may in a few days be killed back to the stock.

Plate I shows a diseased shoot about 10 days after the inoculation was made. The diseased part of the stem was about 2 inches long and darker in colour than the photograph indicates. Plate II shows a shoot which has been killed back for a distance of about 1 foot from the extremity.

The disease has only been observed as occurring in nature on buddings, the attack originating a short distance below the extremity of the shoot. Inoculations on the tip of young shoots of seedlings have, however, caused infection in every case, so that bud-shoots are presumably also liable to this type of infection.

The Causative Fungus.—Two fungi were isolated from the original specimen of the disease, *Phytophthora* sp. and *Gloeosporium alborubrum*. Inoculations with a pure culture of the *Phytophthora* are described above, and since the fungus was recovered in pure culture from the inoculated shoots in the early stages of the disease and successfully re-inoculated into other shoots, the causation of the disease is established.

Owing to the exceptionally large size of the sporangia the fungus was at first thought to differ specifically from *Phytophthora palmivora* (*P. Faberi*) which is the cause of various well-known diseases of Rubber. Cultures were sent to Mr. Ashby of the Imperial Bureau of Mycology and to Mr. Thomson of the Dept. of Agriculture S.S. and F.M.S., to whom the writer is indebted for identifying the fungus as *P. palmivora* in the rubber group. The sporangia are of the *P. palmivora* type but larger than for any strain previously described.

On Quaker Oats agar the fungus produces an abundant aerial mycelium in 3 days. A spherical spore form, which is not quite so thick-walled as the typical chlamydospore of the species, is produced in abundance, while sporangia are relatively scarce. The dimensions of the sporangia of young cultures (3-5 days old) on Quaker Oats agar are $73{\cdot}2 \times 35{\cdot}7$ microns (mean of 150

measurements) with a range of 32-105 × 20-50 microns. The mean ratio of length to width (L/W) is 2·05. The mean diameter of the circular spore form is 40·26 microns (100 measurements) with a range of 20-56 microns.

When grown in mixed culture with a strain of the rubber group no oospores are formed, whereas when grown with a strain of the cacao group oogonia with amphigynous antheridia are freely produced. The isolation must therefore be referred to *Phytophthora palmivora* and is a strain of the rubber group.

Economic Importance.—The disease has not, up to the present, proved a serious factor in retarding the development of young buddings in Ceylon, and has only been reported from three estates. As is indicated above the progress of the disease is largely dependent on wet weather conditions as would be expected from the zoosporangial method of reproduction of the fungus. The chief danger would appear to lie in an outbreak of the disease in a bud-wood nursery in wet weather. If the bud-shoots were very young they might quickly be killed back to the stock and a supply of valuable material might thereby be lost. It is unlikely that older shoots with several growth increments would be completely killed since inoculations have shown that the fungus does not readily attack or spread to the more mature portions of the shoots. There is the possibility, however that *Diplodia* and other secondary fungi might gain entrance to the diseased shoot and cause a complete die-back.

Occurrence in Other Countries.—The disease is known in East and West Java but is stated to occur only when the atmospheric conditions are wet. The fungus causing the disease is apparently the same strain as that isolated in Ceylon. In Sumatra a severe attack of *Phytophthora Faberi* (=*P.palmivora*) in bud-wood nurseries is reported by d' Angremond (1), but it is not known whether this disease was caused by the same strain. In Malaya Weir (2) describes a disease which attacks the young bud-shoot at its extremity and mentions a *Phytophthora* as a possible causal agent.

Control.—A careful watch should be kept on young bud-shoots of valuable material during wet weather. Any diseased shoot should be cut off well below the affected parts and burnt. Neighbouring healthy shoots should be periodically sprayed with Bordeaux Mixture.

REFERENCES

(1) D'Angremond, A.—Annual Report of the Director of the General Experiment Station of the A.V.R.O.S. 1st July, 1928-30th June, 1929.

(2) Weir, J. R.—A blight of young buddings. *Quarterly Journal*, Rubber Research Institue of Malaya, Vol. 1, Nos. 1 and 2, 1929.

Fig. 1

1st grade
2nd grade
3rd grade
4th grade
5th grade
To ground
More than one foot
Very short distance only
Beads not joined up
Chevrons only

PRICKING TESTS ON SOME YOUNG BUD-GRAFTS IN THE RUBBER RESEARCH SCHEME EXPERIMENT STATION BUD-WOOD NURSERY

THESE tests were carried out on budded plants varying in age from ten to twenty months. It was the intention to use for this test five plants from each clone and this was adhered to wherever this number was available. In certain cases fewer were used and the order of merit given has been worked out from the average of each clone.

As will be apparent from the results obtained from the three different methods such a test can never give more than a rough indication of the capabilities of a clone, but, on the other hand, it will be observed that in all cases certain clones compete for the leading places in the order of merit.

It may be advisable to emphasise here that it would be unwise to select material for planting schemes on the results of this test. While some indication of prospective yield may be obtained no information is afforded on the behaviour of the trees under tapping conditions. Renewal may be poor, bark may be thin in the first place, the clone may be liable to brown bast, etc.

The methods employed.—(1) This was carried out by the method advocated by Dr. Cramer for seedling selection. His special pricking knife, and his system of grading were employed.

The knife makes four identical V-cuts simultaneously on the stem. The cuts are about $1\frac{1}{4}$ inches apart and in the present case were made at a uniform height of three feet above the junction of stock and scion.

In grade 1—the latex from the cuts trickled down to the ground.

In grade 2—the latex trickled down more than a foot below the bottom cut.

In grade 3—the latex from the individual cuts joined up but did not flow any distance.

In grade 4—the bead of latex from each cut did not flow far enough to unite with that from the next cut below.

In grade 5—four chevrons of latex only appeared on the stem.

The results from the different members of the same clone varied to a certain extent among themselves and certain trees were of grade 1 while others were of grade 2, etc. The order of merit has been worked out from the averages.

(2) The same instrument was used but in each case the length of flow of the latex was measured in inches. Order of merit was again worked out from the averages.

(3) By this method a piece of bark was removed with a cork-borer and the latex caught in a plasticine cup stuck on the stem. The small pieces of rubber taken from these cups the following day were weighed to 1/100th of a gram. The order of merit was obtained from the averages.

The clue to the letters is as follows :

W.	Wagga Estate	St. G.	St. George Estate
Kob.	Kobowella Estate	Hun.	Hunasgeriya Estate
H.	Heneratgoda	G.	Govinna Estate
Mad.	Madola Estate	Elad.	Eladuwa Estate
D.K.	Dalkeith Estate	K.G.	Kudaganga Estate
Mal.	Malaboda Estate	Amb.	Ambatenne Estate
Mir.	Mirishena Estate	D.B.K.	Culloden (Diyaberia-kande Divn.)
Yog.	Yogama Estate	P.B.	Prang Besar Estate (Imported)
Tal.	Tallagalla Estate	C.O.D.	Culloden (Old Divn.)
C.	Cuilcagh Estate	Kos.	Kosgalla Estate
B.S.	Beau Séjour Estate	L.	Lawrencewatte Estate
Dorset.	Dorset Estate		

Table I

Order of merit		
1st method	2nd method	3rd method
W. 6278	Kob. 41	Kob. 41
Kob. 41	H. 24	Mir. 11
H. 75	Mal. 1	H. 24
H. 445	H. 85	Mal. 1
H. 249	H 82	H 82
H 401	Tal. 2	D.K. 5315
H. 140	H. 441	H. 86
Mad. 22	H. 464	H. 140
H. 86	D.K. 1	H. 445
H. 441	D.K. 5315	H. 441
H. 362	H. 440	H. 75
D.K. 5315	H. 86	D.B.K. 1
H. 82	Elad. 4	Tal. 2
H. 24	H. 75	H. 362

Table I—*(Contd.)*

Order of merit		
1st method	2nd method	3rd method
D.K. 19935	Mir. 11	Mir. 2
Mal. 1	D.B.K. 1	H. 464
Mad. 15	P.B. 25	H. 401
Mir. 11	W. 6278	W. 6278
Yog. 1 H.	H. 362	Yog. 1 H.
Mad. 18	H. 140	Mad. 18
Mad. 46	Mad. 43	H. 249
Tal. 2	Hun. 1391	G. 771
H. 471	H. 445	C.O.D. 5
C. 3	P.B. 8	C. 3
Mir. 2	Mad. 18	P.B. 25
B.S. 5	H. 401	H. 203
Dorset 1	C. 3	H. 440
H. 355	D.K. 19935	H. 85
H. 464	H. 203	Mad. 46
St. G. 45	St. G. 45	H. 355
Hun. 1391	H. 355	Mad. 15
H. 203	G. 771	D.K. 1
Yog. 8 Y.	Tal. 4	D.K. 3513
Mad. 43	K.G. 5	Dorset 1
G. 771	D.K. 3513	B.S. 5
D.K. 1	Dorset 1	H. 471
D.K. 3513	H. 471	L. 1/15
Elad. 4	H. 249	D.K. 19935
H. 440	D.B.K. 2	Elad. 4
H. 85	P.B. 31	Yog. 8 Y.
K.G. 5	Mad. 46	St. G. 45
Amb. 1	C.O.D. 5	Hun. 1391
D.B.K. 1	Mir. 2	Mad. 43
P.B. 31	Yog. 8 Y.	Amb. 2
P.B. 25	Kos. 6	Kos. 6
C.O.D. 3	B.S. 5	K.G. 5
Tal. 4.	Amb. 1	Amb. 1
Kos. 6	Yog. 1 H.	P.B. 31
Amb. 2	Mad. 15	C.O.D. 4
L. 1/15	Mad. 22	Tal. 4
D.B.K. 2	Amb. 2	D.B.K. 2
P.B. 8	C.O.D. 4	P.B. 8
C.O.D. 5	L. 1/15	C.O.D. 3
C.O.D. 4	C.O.D. 3	Mad. 22

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THE SECOND IMPERIAL MYCOLOGICAL CONFERENCE 1929*

RESOLUTIONS

[*Note.*—The following resolutions were adopted by the Conference of Mycologists of the British Empire which met in London in September, 1929. Certain of them affect agriculturists in Ceylon, particularly the resolutions which deal with the treatment and certification of plant material before import in order to prevent the spread or introduction of dangerous diseases from one country to another. The proceedings of the Conference are referred to editorially.—Ed., *T.A.*]

1. That this Conference urges that the necessity for an abstracting journal of the world's literature on Mycological Taxonomy be referred to the International Botanical Congress, Cambridge, 1930.

2. That this Conference accepts the report of the Committee appointed to consider the need for a series of handbooks on the diseases of tropical and sub-tropical crops and recommends that it be referred to the Managing Committee of the Imperial Bureau of Mycology for such action as may be necessary to give effect to it.

3. With a view to protecting the staple agricultural crops of a country, this Conference recommends that the Government thereof should include in its Plant Protection Legislation provisions for growing under quarantine of stock for propagation capable of introducing diseases which may affect such staple crops, and should take measures to ensure that such quarantine can be effectively carried out by or under the supervision of the agricultural authority.

4. The Conference notes the recent outbreak of witch broom disease of cacao in Trinidad and suggests that the attention of the British West African Colonies should be drawn to the desirability of co-operating with neighbouring countries in West Africa in devising steps which will satisfactorily provide against the possible introduction of the disease into West Africa.

5. The Conference suggests that the attention of the Government of Malaya and Ceylon should be drawn to the desirability of investigating the possibility of treating bud-wood of rubber against disease before import.

6. In order to facilitate protective legislation and possibly to further our knowledge of the means by which diseases spread or are introduced from one country to another it is desirable to obtain, in a form readily accessible and up to date, full information in regard to the distribution of disease of crop plants throughout the world. For this purpose, this Conference recommends that provision be made for the necessary work to be undertaken at the Imperial Bureau of Mycology and that the tropical Colonies should make arrangements for group notification.

7. This Conference is of opinion that the system of certificates is one which should be universally recognised but that the acceptance of such certificates should not be allowed to imply that importing countries should in any

* Report on the Second Imperial Mycological Conference 1929. H. M. Stationery Office 1930. (Colonial No. 45).

way waive their right of prohibiting, inspecting, treating, quarantining, and destroying, where necessary, plant imports. It further recommends that steps should be taken to arrange that exporting countries within the Empire should specify as nearly as possible the significance of their certificates covering plant exports.

7a. This Conference also recommends that the form of certificates of inspection appended be submitted for approval to the Ministry of Agriculture and Fisheries in the first instance and then to the Dominions and Dependencies within the Empire, and, if approved, that it then be adopted.

8. This Conference recommends that countries between which planting material frequently passes should endeavour to group themselves together and investigate the possibility of finding a minimum treatment for any specific pest or disease of a particular plant of which the export is required.

9. That research work relative to the important question of seed-borne disease be given increased attention throughout the Empire, if necessary by the appointment of one or more specialists to the respective plant pathological services, and that such investigations be co-ordinated with the duties of seed-testing stations.

10. That this Conference approves the draft prepared by the Committee appointed to formulate a standard method of handling dangerous material (specimens and cultures) in mycological laboratories, and recommends that it be circulated to mycologists throughout the Empire.

11. That special care be taken in the handling of dangerous specimens in mycological laboratories where teaching is carried on.

12. That teachers of plant pathology, if they do not do so already, give careful consideration to the possible risks of introducing cultures of plant pathogenic organisms into countries where disease caused by those organisms do not occur.

13. The Conference appreciating the valuable help that has been given to the Plant Protection Services by the Meteorological Departments in various parts of the Empire, urges the need for further co-operation, and especially, for the more precise formulation by plant pathologists of the data which they would like to obtain.

14. The Conference expresses warm appreciation of the services rendered to mycology and plant pathology by the Centraalbureau voor Schimmelcultures at Baarn, under the direction of Professor Westerdijk, and desires to bring them prominently to the attention of mycologists and plant pathologists throughout the Empire in the hope that means may be provided for continuing and developing the work of the bureau on a still more satisfactory basis.

15. The Conference wishes to place on record its view of the desirability of the republication of certain important mycological works that can no longer be obtained, and requests that the necessary steps should be taken to ensure that this matter is discussed at the International Botanical Congress at Cambridge in 1930.

16. That this Conference accepts the report of the Sub-Committee set up to examine the financial position and organisation of the Imperial Bureau of Mycology, and earnestly hopes that the additional financial assistance which the Sub-Committee regards as essential for a proper continuance of the Bureau's work may be forthcoming.

17. That this Conference reaffirms the fifth Resolution adopted at the First Imperial Mycological Conference, namely, that in view of the benefits derived from an exchange of views between overseas mycologists, Conferences similar to the present one should be held every five years.

ROOT DISEASES OF ORCHARD AND PERMANENT PLANTATION PLANTAIN CROPS, WITH SPECIAL REFERENCE TO THE RELATIVE IMPORTANCE OF THE VARIOUS FUNGI CONCERNED*

[*Note.*—As the result of work which has been undertaken during recent years in Ceylon and in the British West Indies the question of the causation of root diseases has received considerable publicity. The report of the discussion reprinted below indicates the opinions of the mycologists of the British Empire and should be of interest to agriculturists in Ceylon. Editorial reference is made to the proceedings of the Conference.—Ed., *T.A.*]

Prof. Briton-Jones (Imperial College of Tropical Agriculture, Trinidad) in opening this discussion reviewed in detail the records of *Macrophomina Phaseoli* under its various names from the earliest reference to the disease on sweet potato by Halstead in 1890. The records showed the disease to be widely distributed on a large number of hosts in tropical and sub-tropical countries. Taubenhaus in 1913-14 was the first to state quite clearly the secondary importance of the fungus and the speaker stressed somewhat the various opinions of other writers in support of this view. Small, in Ceylon, expressed the contrary opinion in various papers published between 1926-29 and regarded the fungus as a true parasite, whilst other organisms, formerly considered to be primary parasites, he relegated to a secondary position. Gadd was quoted as holding the view that the fungus is a pure saprophyte, while Park suggested that it might function as a mycorrhizal symbiont. Some support for Small had been forthcoming from Steinmann in Java and Hansford in Uganda; but the speaker was inclined to a middle course and to regard the fungus as a faculative parasite when conditions favoured its development. Investigations on the parasitism of the fungus recently carried out by West and Stuckey under his direction afforded definite evidence of the correctness of this view and were very fully described. Many of the attempts to secure infection under various conditions were unsuccessful, but of the others it might be mentioned that jute seedlings grown under moist conditions succumbed within two days of inoculation. Cotton seedlings, grown in pure sand, transplanted to an infected field and manured, became heavily infected, while pot experiments with soil from the same field treated with various fertilizers gave one plant killed on the manured and 18 on the unmanured. Tests of the pathogenicity of *M. Phaseoli* and *Diplodia* to cotton plants growing under varying conditions of moisture and growth suggested that defoliation might result in predisposing the plants to disease, and further experiments corroborated this view. The effect of defoliation on the plants would be to produce a low carbohydrate-nitrogen ratio and the authors suggest that any physiological factor which upsets this ratio may render the plant susceptible. With regard to the parasitism of *Rosellinia* and *Fomes lignosus* the speaker agreed that the former was a parasite but he did not think that the fungus known under the latter name in Trinidad could be considered virulent.

Mr. Ashby (Imperial Bureau of Mycology) followed with a note on the application of the combination *Rhizoctonia bataticola* (Taub.) Butl. It was pointed out that the binomial had been used in Ceylon to cover three strains referred to as A, B and C strains. It was applicable in the strict sense only

* Report of discussion at the Second Imperial Mycological Conference 1929. H. M. Stationery Office 1930. (Colonial No. 45).

to the C group which form minute black sclerotia about 100u or less in diameter and have *Macrophomina Phaseoli* as a pycnidial stage of which *R. bataticola* is, therefore, a synonym. The C strains also cause a charcoal rot of sweet potato. The B strains are characterised by the production of sclerotia about 200 microns in diameter, while the sclerotia of the A strains run to 0·5 mm. or 1 mm. or more in size. Evidence has not yet been furnished that a pycnidial stage occurs in the life cycle of the A and B forms nor that they are able to produce a charcoal rot of sweet potato. The binomial *R. bataticola* can therefore be used at present only provisionally for these two forms.

Mr. Hansford (Uganda) stated that his experience coincided with that of Dr. Small in Ceylon to a large extent. He was convinced that the fungus was primarily parasitic on coffee, on which host it was quite common in Uganda, preceding *Fomes lamaoensis* which was secondary.

Mr. Stockdale (Ceylon) thought that Dr. Briton-Jones had rather exaggerated the convictions of Dr. Small with regard to the parasitic nature of *M. Phaseoli*. Dr. Small was very guarded in his first reports and advanced slowly to the view that the fungus can atatck healthy plants but he did not push his view to the extreme Dr. Briton-Jones might have led the Conference to believe. Positive evidence of the parasitic nature of the fungus on tea, coffee and rubber were obtained before the speaker left Ceylon last year. He considered that Dr. Small's work had been of great value because it focussed the attention of mycologists in the tropics on a very definite problem.

Mr. South (Federated Malay States) gave an account of his experience of root diseases which attack rubber in Malaya. These could be classified into two groups (a) *Fomes lignosus* attacking young trees and (b) Fungi of various kinds (chiefly *Fomes pseudoferreus, Ustulina zonata, Sphaerostilbe repens,* and the not fully identified species causing brown foot diseases) on older trees. He had had a large field experience of *Fomes lignosus* and cited an instance where the fungus attacked most of the trees of a two-year-old plantation of 50 acres and was so prevalent that, if one kicked the soil with one's foot, strands of *F. lignosus* were exposed. Under these conditions the fungus was undoubtedly parasitic. Both *F. lignosus* and *Rosellinia* spread in a circle. With regard to the second group, Mr. Belgrave had definitely established the parasitism of *Fomes pseudoferreus* by experiment. *Ustulina zonata* needed further investigation, whilst *Sphaerostilbe* usually developed in water-logged soils.

Dr. Gadd (Ceylon Tea Research Institute) stated that the original contention of Dr. Small that *R. bataticola* was the basic cause of all root disease in Ceylon meant that *Fomes lignosus* and other fungi were merely secondary and that control measures against these organisms was ill-advised. The good results attending such control measures, however, compelled him to protest against their abandonment. He considered that Dr. Briton-Jones had misinterpreted his views. He had not stated that control by trenching was a proof of parasitism; he had merely emphasized the success attained by this method of control. The speaker called attention to the absence of proof of the parasitisms of *R. bataticola* but stated he had got positive results with *Rosellinia*. The tea plant undergoes severe treatment from plucking and pruning and this treatment appears to predispose the plant to attacks by *Diplodia*, the effects of which the speaker was inclined to think might have been confused with those attributed to *R. bataticola*. If pruning and plucking were the real cause of trouble, then control should be directed against these factors. Tea bushes in dry patches of shallow soil often bore both *R. bataticola* and *Diplodia*, but it was questionable whether the drought was the cause of the trouble or whether this was due to the fungi present.

Dr. Reichert (Palestine) gave an account of the root diseases of Palestine. In the seed bed citrus is affected by a species of *Rhizoctonia* and in the orchard by stem, collar and root rot, the exact causes of which are unknown. Vine roots suffer from Phthyriosis, an epidemic disease in which the roots are covered by a thick fungal layer under which *Pseudococcus vitis* is found. Apple and peach trees showed a root rot apparently caused by a species of *Rhizoctonia,* and *Carica papaya* by one due to a *Pythium.* Banana roots show a decay usually associated with nematodes, but the cause has not been determined. *R. bataticola* was first found in 1923 causing stalk rot of tobacco, but has now been recorded on 34 different hosts. Of special interest is the occurrence of this fungus on sweet lemon, causing a bark and root rot, and on garlic, sunflower, and maize, on which it acts saprophytically. *R. bataticola* is only able to attack plants when they are in an enfeebled condition, and the speaker suggested that it may be truly a saprophyte which by gradual adaptation is becoming parasitic.

Dr. Nattrass (Egypt) described his investigations on *Rosellinia necatrix,* the cause of a disease of fruit trees in England. He had no doubt about the parasitism of this fungus.

Dr. Gadd inquired whether *R. necatrix* was associated with any definite soil conditions.

Dr. Nattrass replied that the fungus was confined to the west of England, but no association with special soil conditions were observed.

Mr. F. E. V. Smith (Jamaica) stated that *Rosellinia* causes considerable trouble in Jamaica when there is excess of humus. The strongest trees were frequently those attacked.

Prof. Briton-Jones observed that Dr. Small had somewhat modified the opinion expressed in his earlier papers and now agreed that secondary factors were important in the parasitism of the fungus. With regard to the case of the death of the tea bushes on shallow soil mentioned by Dr. Gadd, he thought that much could be done in the alleviation of drought, even in the tropics, by the addition of humus to the soil. The speaker emphasized the importance of the internal constitution of the plant as factor determining susceptibility to the fungus.

Mr. F. T. Brooks, in closing the discussion, mentioned that from his tropical experience he was fully persuaded of the evident parasitism of ***Fomes*** ***lignosus*** and *Ustulina zonata.*

MEETINGS, CONFERENCES, ETC.

BOARD OF AGRICULTURE

Minutes of a Meeting of the Board of Agriculture held in the Board Room of the Department of Agriculture, Peradeniya, at 12 noon, on Thursday, February 20th, 1930.

His Excellency the Governor, President of the Board of Agriculture, presided.

The following members were present:

The Acting Director of Agriculture; the Government Agent, Central Province; Sir Solomon Dias Bandaranaike, K.C.M.G.; the Government Agricultural Chemist; the Acting Government Entomologist; the Acting Government Mycologist; the Acting Government Economic Botanist; Mr. G. A. Goonetilleke, Gate Mudaliyar; Mr. S. Ramalingam, Gate Mudaliyar; Mr. W. Samarasinghe, Attapattu Mudaliyar; Mr. G. W. Gooneratne, Mudaliyar; Mr. N. Wickremaratne, Mudaliyar; S. M. P. Vanderkoen, J.P., Mudaliyar; Mr. S. Muttutamby, Mudaliyar; Mr. W. A. Udugama, Ratemahatmaya; Mr. H. L. de Mel, C.B.E.; Mr. G. R. de Zoysa, J.P.; Messrs. R. P. Gaddum; L. F. Roundell; A. W. Warburton-Gray; A. A. Wickremasinghe; S. Pararajasingham; C. A. M. de Silva; J. Fergusson; A. W. Ruxton; J. W. Ferguson; H. D. Ditmas; G. Pyper; T. Wallooppillai; Wace de Niese; G. L. Doudney; T. J. Wilson; and T. H. Holland (Acting Secretary).

Visitors.—Messrs. B. C. W. Taylor; S. K. Wijayaratnam; D. A. A. Perera; and M. E. Antrobus, Private Secretary to His Excellency the Governor.

His Excellency the Governor expressed his pleasure at meeting the members of the newly-appointed Board of Agriculture. He reiterated his abiding interest in the agriculture of the country and said he was always glad to find himself in contact with those who made a special study of agriculture.

He referred to the departure of the late Director, Mr. Stockdale, and said that he was sure that all who were in any way connected with agriculture would retain the most grateful memory of the great services Mr. Stockdale had rendered to the Island. He said that he was sure also that members would wish him to express their great appreciation of the admirable manner in which Dr. Small had discharged the difficult task of taking charge of the Department between Mr. Stockdale's departure and the arrival of his successor. His Excellency said that Dr. Small had not only carried out his duties to the full and complete satisfaction of the Government but had, he knew, won the confidence and warm regard of the unofficial members of the community engaged in agriculture. He referred to the impending arrival of the new Director, Mr. Youngman, and said that he was certain that Mr. Youngman would receive both from officials and unofficials all the co-operation and support he would need in carrying out his very important duties.

His Excellency then read a list of those members who had written regretting their inability to attend the meeting.

The names were as follows:

Mr. C. Muttyah; Mr. E. C. Villiers; the Director of Irrigation; the Government Agent, Southern Province; the Assistant Government Agent, Mullaittivu; Mr. C. B. Herat, Kachcheri Mudaliyar; Mr. J. H. Titterington; Mr. C. Drieberg, Mr. J. D. Dunlop; Mr. B. M. Selwyn; Dr. T. B. Kobbekaduwa; Mudaliyar S. P. Wijetunga; the Hon.

the Controller of Revenue; Messrs. J. E. P. Rajapakse; C. C. du Pré Moore; A. H. Reid; R. G. Coombe; C. E. A. Dias; J. Horsfall; the Hon. Mr. T. B. L. Moonemalle; the Hon. Mr. C. E. Hawes; Gate Mudaliyar A. E. Rajapakse; Mr. J. Sheridan-Patterson; the Hon. Mr. D. H. Kotalawala and the Hon. Mr. M. M. Subramaniam.

The minutes of the last meeting, which had been circulated to members, were then confirmed.

Arising out of the minutes Mr. H. L. de Mel then made some remarks on two subjects dealt with at the previous meeting. These two subjects were fruit growing in Ceylon, and the Coconut Research Scheme.

Dealing first with fruit growing Mr. de Mel alluded to the Fruit Growers' Association which had been formed under the presidency of Sir Solomon Dias Bandaranaike as a result of interest aroused in the matter by previous discussions. He described the work being done by the Association and the limitations and difficulties which hindered its progress. He quoted figures illustrating the enormous annual importations of fruit, both fresh and preserved, and of vegetables, and said that nearly ten million rupees were annually leaving the country to pay for these importations. A great deal of this wealth could be kept in the Island if the cultivation of fruit and vegetables could be widely taken up on sound modern lines. He brought this matter before the Board in order to stimulate interest in the subject and to focus the attention of the Board in the minor agricultural industries of the country.

His Excellency said that they had listened with great interest to Mr. de Mel's observations which had brought home to members a position, the existence of which they were not unaware, namely that Ceylon was not producing as much of these minor agricultural crops as she might do. He alluded to the necessity of producing high class fruit and thought that an organisation such as Mr. de Mel referred to was essential both for the fostering of the production and marketing of fruit. He did not think that Ceylon would ever be a great fruit exporting country but agreed that an endeavour should be made to meet local demand more effectively. He also agreed that it was absurd that such vast quantities of vegetables should be imported when a considerably greater quantity could be grown in the Island. He thought the discussion would be useful in reminding people that an effort should be made to stimulate minor industries and organise them in the proper way.

The following resolution was then proposed by Mr. de Mel, seconded by Mr. Wace de Niese, and carried:—"That this Board refers the question of fruit growing and vegetable cultivation for the special consideration of the Food Products' Committee of the Board of Agriculture."

Mr. J. P. Blackmore enquired whether Mr. de Mel could inform him whether plantains were being exported from Ceylon.

Mr. de Mel said that at present a certain amount of plantains were taken on as ship's stores in Colombo but he regretted that they were not usually of good quality. They had however a definite order from Australia for fifty cases a fortnight of a variety of plantains grown in the hill country known as *anamalu*. This variety was known elsewhere as Gros Michel. It was the only Ceylon variety that would stand the twelve days' voyage, ripening only about the fourteenth day. Unfortunately there were not a sufficient number of co-operators to ensure the provision of this fortnightly consignment. There was of course always a possibility that the Australian Government might put a prohibitive tax on imported plantains in order to foster the Queensland industry.

Mr. G. R. de Zoysa said that he had heard that the Coconut Research Scheme contemplated the purchase of an estate in the Chilaw district known as Bandirippuwa. He thought this unwise as the estate was fully cultivated

and what they wanted for their experiments was land with plants in various stages of growth, varying types of soil, and if possible partly under jungle. By distributing the experiments in small blocks throughout the coconut districts a wider circle of villagers and coconut growers would be reached.

Dr. Small in reply said that all the points mentioned had received the careful consideration of the Board of the Coconut Research Scheme and particularly of the Estate Sub-Committee. For the fundamental work to be first undertaken a well grown uniform area of coconuts was essential. It was a mistake to suppose that a central station needed poor land and that the Scheme would at the outset demonstrate to cultivators what could be done on such land. Such work would be underaken later and there was every intention at a later date of extending the work in other districts, particularly those in which conditions were difficult.

Mr. de Zoysa then criticised the purchase of Bandirippuwa estate on the grounds of extravagance. He further inferred that on a full grown estate there was but little to experiment in.

Mr. H. L. de Mel questioned the wisdom of sinking so much capital in buying 200 acres of fully developed land costing more than a thousand rupees per acre. The Tea and Rubber Research Schemes had been criticised on the ground of extravagance and he felt that the Coconut Research Scheme would be liable to similar criticism. He suggested that demonstrations should be carried out on 50-acre blocks and that part of the capital should be saved for scienctific investigations and for the study of what he considered to be the most important part of coconut planting, namely the selection of seed nuts. He referred to the great handicap of malaria in coconut planting and suggested that it would be better to have the experiment station in a malarial district so that this problem could be studied.

Dr. Small said he was afraid Mr. de Mel was too late with his objection to the purchase of the land since the Board had already decided to buy two hundred acres at Bandirippuwa. He assured Mr. de Mel that the Estate Sub-Committee had acted with great care and had inspected over 30 estates. With regard to malaria the prime function of the Research Scheme was to attend to research work in coconuts and not to medical problems. He could assure Mr. de Mel that other estates were not available and Mr. Fergusson, who was a member of the Estates Sub-Committee, would back him up in this.

Mr. Fergusson said he thought that the Committee had shown care and caution in purchasing an estate which would pay its way and possibly leave something over rather than purchasing blocks of poor land in feverish districts which could not be expected to pay a return.

ELECTION OF COMMITTEES

His Excellency read out the names of members nominated to serve on the Executive Committee. The names were as follows:

His Excellency the Governor, President
The Hon. the Colonial Secretary, Vice-President
The Hon. the Controller of Revenue
The Director of Agriculture
The Hon. Sir H. Marcus Fernando
Sir S. D. Bandaranaike
The Hon. the Member for the European (Rural) Electorate
The Hon. Mr. A. Mahadeva
The Chairman, Planters' Association of Ceylon
The Chairman, Low-Country Products' Association
Mr. R. G. Coombe
Mr. C. E. A. Dias

EX-OFFICIO MEMBERS.

The Government Agent, Western Province
The Government Agent, Central Province
The Government Agent, Southern Province
The Government Agent, North-Western Province
The Government Agent, Northern Province
The Director of Irrigation
Mr. J. I. Gnanamuttu, (Secretary)

His Excellency proposed and Dr. Small seconded that the gentlemen whose names had been read out should be elected. This was carried.

His Excellency then read the names of members nominated for the Estate Products Committee. The names were as follows:

The Director of Agriculture, Chairman
Sir S. D. Bandaranaike, K.C.M.G.
Mr. W. S. Burnett
Mr. J. P. Blackmore
Lieut.-Col. J. A. Bond
The Chairman, Low Country Products Association
The Chairman, Planters' Association of Ceylon
The Agricultural Chemist
Mr. R. G. Coombe
Mr. C. E. A. Dias
Mr. H. D. Ditmas
Mr. J. D. Dunlop
Mr. G. L. H. Doudney
Mr. C. Drieberg
The Entomologist
The Hon. Sir H. Marcus Fernando
Mr. J. W. Ferguson
Mr. J. Fergusson
Mr. F. H. Griffith
Mr. A. W. Warburton-Gray
Mr. R. P. Gaddum
Mr. J. Horsfall
Dr. T. B. Kobbekaduwa
The Hon. Mr. D. H. Kotalawala
The Hon. Mr. A. Mahadeva
Mr. H. L. de Mel, C.B.E.
The Manager, Experiment Station, Peradeniya
Mr. C. C. du Pré Moore
The Mycologist
The Hon. the Member for the European (Rural) Electorate
Mr. Wace de Niese
Mr. S. Pararajasingham
Mr. J. Sheridan Patterson
Mr. Gordon Pyper
Mr. A. E. Rajapakse, Gate Mudaliyar
Mr. J. E. P. Rajapakse
Mr. A. H. Reid
Mr. L. F. Roundell
Mr. A. W. Ruxton
Mr. B. M. Selwyn
Mr. A. T. Sydney Smith
The Government Veterinary Surgeon
Mr. Chas. A. M. de Silva
Mr. N. D. S. Silva

Mr. J. H. Titterington
Mr. S. M. P. Vanderkoen, Mudaliyar
Mr. E. C. Villiers
Mr. T. J. Wilson
Mr. G. Robert de Zoysa, J.P.
Mr. T. H. Holland, (Secretary)

Dr. Small proposed and Mr. C. A. M. de Silva seconded that those members whose names had been read out should be elected.

Mr. H. L. de Mel enquired if it was possible to add a name to the list.

Dr. Small replied that it was not possible to propose the name of one who was not a member of the Board of Agriculture but that the Committees had power to co-opt members and there was never any difficulty in doing so.

The resolution that the members whose names were read out should be elected was then carried.

His Excellency then read out the names of members nominated for election to the Food Products Committee. The names were as follows:

The Director of Agriculture, Chairman
Mr. W. A. Ameresekere, Kachcheri Mudaliyar
Mr. C. W. Bibile, Ratemahatmaya
The Economic Botanist
The Agricultural Chemist
Mr. C. Drieberg
The Divisional Agricultural Officer; Central
The Divisional Agricultural Officer; Southern
The Divisional Agricultural Officer; Northern
The Divisional Agricultural Officer; North-Western
The Divisional Agricultural Officer; South-Western
The Entomologist
The Hon. Sir H. Marcus Fernando
Mr. G. A. Goonatilleke, Gate Mudaliyar
Dr. T. B. Kobbekaduwa
Mr. G. W. Gooneratne, Mudaliyar
Mr. C. B. Herat, Kachcheri Mudaliyar
The Hon. Mr. A. Mahadeva
The Hon. Mr. T. B. L. Moonemalle
Mr. H. L. de Mel, C.B.E.
The Hon. the Member representing the Central (Urban) Electorate
Mr. J. E. P. Rajapakse
The Mycologist
Mr. C. Muttyah, J. P.
Mr. S. Muttutamby, Mudaliyar
Mr. Wace de Niese
Mr. S. Pararajasingham
Mr. R. S. V. Poulier, A.G.A.
Mr. A. E. Rajapakse, Gate Mudaliyar
Mr. W. A. Samarasinghe, Attapattu Mudaliyar
Mr. Chas. A. M. de Silva
The Hon. Mr. M. M. Subramaniam
The Government Veterinary Surgeon
Mr. Walter A. Udugama, Ratemahatmaya
Mr. T. Wallooppillai
Mr. A. A. Wickremasinghe
Mr. S. P. Wijetunge, Mudaliyar
Mr. G. Robert de Zoysa, J.P.
Mr. M. S. Ramalingam, Gate Mutaliyar
Mr. N. Wickremaratna, Mudaliyar (Secretary)

It was proposed by Dr. Small and seconded by Mr. Pararajasingham that those members whose names had been read out should be elected. This was carried.

AGRICULTURAL CONFERENCE 1930

His Excellency explained that the last Conference was held in 1928. In 1929 it was decided to await the arrival of the new Director of Agriculture. It was not of course anticipated that this event would be so long delayed. It was hoped to hold a Conference in 1930 but the question now arose as to whether it should be held at the earliest possible date or whether it should be deferred till he (H. E. the Governor) had returned to the Island in August and the new Director of Agriculture had had time to acquaint himself with local conditions.

Mr. G. R. de Zoysa thought that everything pointed to postponing the Conference. It was most desirable that the Director of Agriculture should have time to acquaint himself with local problems and conditions and he was sure that it was the wish of all members that His Excellency should preside at the Conference. He proposed that the Conference should be postponed till His Excellency's return.

Mr. Wace de Niese spoke in support of this plan and seconded Mr. de Zoysa's resolution which was unanimously carried.

His Excellency suggested that the Conference should be held in September and this was agreed to.

His Excellency thanked the members for their attendance and support and declared the meeting adjourned.

T. H. HOLLAND,
Acting Secretary,
Board of Agriculture.

BOARD OF AGRICULTURE

ESTATE PRODUCTS COMMITTEE

Minutes of the Forty-seventh Meeting of the Estate Products Committee of the Board of Agriculture held at the Head Office of the Department of Agriculture at 2 p.m. on Tuesday March 11, 1930.

Present.—The Acting Director of Agriculture (*Chairman*), the Agricultural Chemist, the Acting Entomologist, the Acting Mycologist, the Hon. Mr. C. E. Hawes, Sir Solomon Dias Bandaranaike, Messrs. J. Fergusson, A. H. Reid, W. S. Burnett, B. M. Selwyn, C. A. M. de Silva, S. Pararajasingham, J. E. P. Rajapakse, N. D. S. Silva, G. Pandittasekera, J. Sheridan-Patterson, J. Horsfall, A. T. Sydney-Smith, G. Pyper, J. H. Titterington, C. Drieberg, J. W. Ferguson and T. H. Holland, (Secretary).

Visitors.—Messrs. C. Bourchier, V. Canagaratnam, P. R. Shand, R. Murdoch and J. C. Haigh.

Letters or telegrams regretting inability to attend were received from Lt.-Col. J. A. M. Bond, the Hon. Mr. D. H. Kotalawala, Mudaliyar S. M. P. Vanderkoen, Dr. T. B. Kobbekaduwe, Messrs. J. P. Blackmore, A. W. Ruxton, H. L. de Mel, R. P. Gaddum, Wace de Niese, G. Robert de Zoysa and L. F. Roundell.

AGENDA ITEM 1.—CONFIRMATION OF MINUTES

The Chairman said that the minutes of the last meeting held in November, 1929, had been circulated to members. Sir Solomon Dias Bandaranaike moved and Mr. N. D. S. Silva seconded that the minutes be confirmed. This was carried.

AGENDA ITEM 2.—CO-OPTING OF MEMBERS

The Chairman read a list of gentlemen who were desirous of joining the Committee and asked for further names. The following names were finally put forward: The Director of the Tea Research Institute, the Chemist of the Rubber Research Scheme, Messrs. C. H. Wilkinson, F. A. E. Price, W. Y. Mackintosh, G. B. Foote, A. Coombe, J. B. Coles, H. D. Garrick, R. Murdoch, J. Forbes, C. Bourchier, F. R. Dias, J. Tyagaraja, Hon. Mr. D. S. Senanayake and Mr. H. W. Roy Bertrand, F.L.S.

The Chairman proposed and Mr. C. A. M. de Silva seconded that the gentlemen whose names had been read out should be co-opted as members of the Committee. This was carried.

AGENDA ITEM 3.—PROGRESS REPORTS OF THE EXPERIMENT STATION, PERADENIYA, FOR THE MONTHS OF NOVEMBER AND DECEMBER, 1929 AND JANUARY AND FEBRUARY, 1930

Mr. Holland reviewed the report for November and December, 1929.

Commenting on the results of the systems of tapping to death in the rejuvenation experiment, Mr. Selwyn said that it did not seem likely that large increases of yield would be obtained by drastic tapping systems.

Mr. Holland said that there was evidence to show that the drying up of a large number of cuts in this case was due solely to the daily tapping. He had received information of considerable increases of yield being obtained over a short period by tapping on four cuts per tree on alternate days. It would be necessary to avoid ringing the trees.

Mr. Pyper, referring to the tea plots under *Indigofera endecaphylla*, asked if it was possible to state that the increased yields were due to the *Indigofera* since there were no control plots.

The Chairman agreed that the absence of control plots was a weak point but said that it had certainly been shown that the *Indigofera* had not depressed yields, and the improvement in the condition of that soil was undoubted.

Mr. de Silva, referring to Mr. Holland's remarks on Citrus fruits, suggested that an experiment should be made in removing fruiting buds from trees before the ordinary fruiting season in order to induce the trees to fruit out of season.

The Chairman promised to consider this question.

Mr. Pararajasingham then moved, and Mr. Drieberg seconded, that the report be adopted. This was carried.

Mr. Holland then reviewed the progress report for January and February, 1930.

The Chairman, referring to the fresh trial of cinchona plants, said that this was the outcome of the desire of the anti-malarial authorities that Ceylon should produce its own quinine.

Mr. Sydney-Smith enquired if there were not new and superior varieties of cinchona which could be obtained.

The Chairman said that the Dutch had done a great deal of work in grafting and selection in cinchona but he did not think it would be easy to obtain planting material.

Mr. Shand gave his early experiences in cinchona planting and related the phenomenal drop in price which had resulted in the abandonment of cinchona cultivation in Ceylon. He said that whereas *Cinchona succirubra* and *Cinchona officinalis* grew well in Ceylon, *Cinchona ledgeriana* had never been a success.

Mr. Sydney-Smith thought that an effort should be made to obtain any new and superior varieties available.

The Chairman promised to see what could be done.

Mr. C. A. M. de Silva asked for information as to the number of head of cattle that could be maintained on a given area of fodder grass and the cost of cultivating such grass.

The Chairman promised to supply what information was available by correspondence.

Sir Solomon Dias Bandaranaike then moved, and Mr. Sheridan-Patterson seconded, that the report be adopted. This was carried.

AGENDA ITEM 4.—VISITORS' DAY AT THE EXPERIMENT STATION, PERADENIYA

The Chairman explained the desirability of a visitors' day being fixed and asked for suggestions from members.

Mr. Hawes suggested the second Wednesday in every month.

Mr. Pyper suggested that the morning of the second Tuesday, *i.e.* the morning of the day on which the Estate Products Committee Meetings were held, would be more suitable.

In response to an enquiry from the Chairman, Mr. J. W. Ferguson said that he thought the institution of a visitors' day at St. Coomb's was a distinct success. The presence of several visitors at a time stimulated discussion and added interest.

Mr. Hawes then withdrew his suggestion and the meeting agreed that visitors' day should be on the days on which Estate Products' Committee meetings are held and on the second Tuesday in the intervening months, in every case at 9 a.m.

AGENDA ITEM 5.—TEA PRUNING EXPERIMENT AT PERADENIYA

A memorandum had been circulated to members making tentative suggestions for an experiment in the Hillside tea, on the Experiment Station, Peradeniya, and asking for suggestions from members as to the nature of the experiment.

Mr. Sydney-Smith enquired with what object it was proposed to conduct an experiment, whether to test healing or for crop. He did not think it possible to conduct a pruning experiment since different styles of pruning demanded different plucking, tipping and manuring. Pruning could not be considered alone.

Mr. Holland said that attention had been drawn in the memorandum to the necessity for laying down a programme of manuring, tipping, etc., and it was on these points, as well as the pruning, that suggestions were asked for.

After some further discussion a Committee consisting of Messrs. Sydney-Smith, G. Pyper, and the Visiting Agent of St. Coomb's Estate was appointed to consider the matter.

AGENDA ITEM 6.—RUBBER MANURIAL EXPERIMENT AT PERADENIYA

The plan of a new manurial experiment laid down in the New Avenue Rubber of the Experiment Station, Peradeniya, was given in full in the progress report for November and December, 1929. This item was therefore included in item number 3.

AGENDA ITEM 7.—THE KALUTARA SNAIL

Copies of letters from Dr. J. Pearson, Director of the Colombo Museum and Mr. W. W. A. Phillips, Secretary of the Game Protection Society had been circulated to members.

To Dr. Pearson's letter was attached a report from Mr. G. M. Henry, Assistant in Systematic Entomology. All three authorities agreed that it would be inadvisable and of little use to attempt to introduce protective measures for either the jungle crow or the ruddy mongoose.

Sir Solomon Dias Bandaranaike gave his experience of the beneficial action of the jungle crow in reducing the numbers of the Kalutara snail. With reference to the damage this bird did by robbing the nests of birds beneficial to agriculture, he pointed out that the common crow, in addition to hawks, eagles, and other predacious birds, did far more damage in this respect. He considered it desirable to protect the jungle crow.

Messrs. Drieberg and de Silva supported this view.

The Chairman quoted the views of Messrs. Henry and Phillips in opposition to this course.

Sir Solomon Dias Bandaranaike proposed and Mr. Pararajasingham seconded that Government be asked to legislate for the protection of the jungle crow.

An amendment was proposed by Mr. Sydney-Smith and seconded by Mr. Burnett to the effect that no action should be taken in the matter.

The question was put to the vote and Mr. Sydney-Smith's amendment was carried by 15 votes to 4.

The question of the protection of the ruddy mongoose was then submitted to the meeting.

Mr. J. W. Ferguson proposed and Sir Solomon Dias Bandaranaike seconded that no action should be taken for the protection of the ruddy mongoose. This was carried.

The Chairman then read a letter from Mr. H. L. de Mel advocating that the Kalutara snail be declared as a pest. The Chairman said that the question had previously been submitted to the Planters' Association but this body had, he believed, dropped the matter. The objection to declaring, the Kalutara snail as a pest, was the difficulty in carrying out any effective measures for its extermination. He thought it advisable however to reopen the matter at a future meeting of the Committee.

Reprints of an article by Mr. C. E. A. Dias on the prevention of soil erosion, together with diagrams, were tabled for the information of members.

T. H. HOLLAND,
Secretary,
Estate Products Committee.

THE TEA RESEARCH INSTITUTE OF CEYLON

MINUTES of a Meeting of the Board of the Tea Research Institute of Ceylon, held in the Victoria Commemoration Buildings, Kandy, on Monday, the 27th January, 1930, at 10-30 a.m.

Present.—Mr. R. G. Coombe, (Chairman), Hon. Mr. C. W. Bickmore (Acting Colonial Treasurer), Dr. W. Small (Acting Director of Agriculture), the Hon'ble Mr. D. S. Senanayake, Messrs. E. C. Villiers, W. Coombe, H. Scoble Nicholson, John Horsfall, A. W. L. Turner, (Secretary), F. C. Macdonald, (Assistant Secretary) and by invitation Dr. R. V. Norris (Director) and Mr. J. W. Ferguson (Visiting Agent).

Absent.—Messrs. D. S. Cameron, T. B. Panabokke, P. A. Keiller, and C. H. Figg.

I. Notice calling the Meeting was read.

II. Minutes of a Meeting of the Board of the Tea Research Institute of Ceylon, held on the 30th September, 1929, were taken as read and confirmed.

III.—FINANCE

(a) *Statement of Accounts as at 31st December, 1929.*—The statement of accounts was tabled.

Fixed Deposits.—The Chairman, referring to these, said that Rs. 150,000, would expire on the 14th February and Rs. 100,000/- on the 21st February. He added that the current account had a balance of Rs. 160,000/-.

It was decided that Rs. 150,000/- should be put on Fixed Deposit for a period of six months. The Secretary was instructed to make enquiries from the Bank.

(b) *Estimates for 1930 and two following years.*—The Chairman, presenting these informed the Meeting that the Sub-Committee appointed to prepare the Estimates had gone very carefully into the question for the next three years. The statement drawn up, together with the Committee's Report thereon had been in the hands of the Board for more than a fortnight. He had considered it advisable to add a forecast for 1933 to 1934, especially with regard to the capital expenditure, but emphasised that the figures could only be considered approximate. They were included to assist the Board to gauge the position and to come to a decision with regard to the building programme.

Dr. Norris at the Chairman's request explained the Research part of the Budget, taking the research work into account first under the different heads.

Personnel Emoluments to the Scientific Staff.—These show an increase of Rs. 10,000/- of last year's amount, due to the new appointments.

Laboratories.—A Memorandum containing the suggested expansion of the staff and the various proposals with regard thereto had been sent to each member of the Board under Circular No. A. 28/29, dated the 25th September, 1929.

At present there are three Junior Assistants but they are only capable of routine work under direct supervision. In the near future it is proposed to have a man of higher qualifications with some research experience capable of semi-independent work in each of the chemical sections.

Dr. Evans (Bio-Chemist) is due to go on leave this year and it is felt that there should be somebody competent to carry on his work. The person appointed will be under the direct supervision of the Director.

Mr. Eden (Agricultural Chemist) is due to go on leave in the following year and the Budget allows for another Research Assistant to carry on his work. It was also proposed to appoint a Junior Assistant to the Mycological section as soon as Dr. Gadd returns from leave. The salary of the Research Assistant will be Rs. 200/- rising up to Rs. 400/- per mensem.

Further work must be undertaken on the Entomological side. The question of Nettle Grub in Uva is a very important matter and as the Department of Agriculture is unable to take it up, the Institute ought to face it as soon as possible if money is available. If this work is undertaken it will mean taking on another Assistant in 1930.

In order to help the Institute to investigate this pest, Gonakellie Estate has offered to provide free quarters, coolies and insecticides, etc. He therefore hoped that the Board would agree to these proposals. The sum involved for the first year will be Rs. 4,500/- in addition to the tabled estimate.

A second clerk will be required when the Staff moves to St. Coomb's and a Field Assistant in 1931.

Capital Expenditure.—The original estimate for the Laboratories was Rs. 170,800/-. To this amount Rs. 27,100/- will have to be added being cost of transport of materials, further site cutting, sand, shelving, and an additional gas plant, etc., bring the total figure to Rs. 197,900/-.

4 Senior and 4 Junior Staff Bungalows.—A saving is probable on the 10 per cent. extra which includes Architect's fees, site cutting and scaffolding.

Furniture.—The Board at the last Meeting sanctioned Rs. 3,500/- for furniture and Rs. 500/- for floor covering plus Rs. 375 for rail freight.

Additional furniture was required for Mahagalla Bungalow for the Entomologist which will later on be used on St. Coomb's.

Junior Scientific Staff Bungalows.—Rs. 1,000 is allowed for furniture and Rs. 250/- for floor covering and Rs. 125/- for rail freight.

Clerks' Quarters.—Two at Rs. 4,100/-, and Rs. 300/- is allowed for furniture and Rs. 600/- for site cutting, etc., as in the case of the Tea-maker's house.

Subordinate Staff Quarters.—The vote provides accommodation for six laboratory peons, five drivers (one of whom will be Research and other four private drivers) and four servants (married).

The telephone service and quarters for the telephone operator are estimated at Rs. 4,500/-. The Institute will then have its own Exchange on St. Coomb's.

Temporary Lines.—30 room lines costing Rs. 3,500/- had to be built to accommodate the Contractor's labour.

The Director continued that in the 1931 Estimates there was an increase in the Revenue Expenditure which was accounted for by the Junior Staff appointments and the Capital Expenditure was based on his memorandum sent out with Circular No. B. 2/30 dated the 9th January.

In 1932 the Research Expenditure shewed a saving under Laboratories. Under Capital Expenditure provision was made for one Senior and two Junior Staff Bungalows. The reason for building only one Senior Scientific Staff Bungalow was because during the current year Mr. King will be at Mahagalla and when Dr. Evans goes on leave, Mr. King will occupy Dr. Evans' quarters and subsequently when Mr. Eden goes on leave Mr. King will be accommodated in Mr. Eden's Bungalow. This will still leave one Bungalow to be built in 1933 for Mr. Tubbs who will temporarily stay in one of the Junior Scientific Staff Bungalows.

The Chairman added that he thought it advisable to give a forecast for the years 1933 and 1934 shewing what was necessary to carry out the full equipment of the Institute. In 1933 provision is made for the last Senior Scientific Staff Bungalow and for one Junior Staff Bungalow.

In 1934 provision is made for one Junior Staff Bungalow thus completing the programme of six Senior and ten Junior Staff Bungalows.

The Chairman, reviewing the Sub-Committee's Report, said that the deficit at the end of 1934 would be in the neighbourhood of two lakhs. The main item for this being the new Physiological section which was responsible for approximately Rs. 145,000/- and was not anticipated in the original Scheme.

The Director had made out figures in this connexion for the five years and they were as follows :

The salaries of the Plant Physiologist, Junior Assistants and Laboratory Peons amount to Rs. 78,525/- and the quarters for the above Staff, drivers, servants, etc., amount to Rs. 66,013/-.

The Chairman considered that the best way to meet the deficit mentioned would be to increase the present cess of ·10 of a cent by 50 per cent. that is to say ·15 cent for the years 1931 and 1932, this would give Rs. 112,500/- each year and should leave the Institute with a small credit balance as a reserve against further possible contingencies.

Mr. Bickmore pointed out that the Ordinance would have to be amended if the cess were to be increased and he asked if there was any possibility of reducing expenditure.

With regard to the Estate Estimate Mr. Ferguson assured the Board that the prices of St. Coomb's teas should he felt be equal to any in the District. During the last two years rainfall had been much below the average and in 1929, ranfall was the shortest in Dimbula for 35 years. He had every hope that the Estate would secure the estimated crop in future. He added that his policy was to bring the estate into good condition piece by piece rather than attempt to put everything right in the first year.

The Chairman said that the estimates shewed that while the Institute might be in difficulties for two or three years after 1934, it should be on firm ground and carry forward a credit balance each year. He asked the Board if it approved the building programme as presented.

Mr. W. Coombe said that it was essential that the Institute be properly equipped and he expressed the opinion that the necessary money could be raised.

Mr. Horsfall supported Mr. W. Coombe.

Mr. Villiers suggested that the Agency Firms should be approached in the matter.

Mr. Senanayake said he felt that the Institute was spending too much on the Bungalows.

The Chairman assured Mr. Senanayake that many hours had been spent before a decision was arrived at with regard to the Bungalows and their costs. The apparently high costs were due to the fact that a large amount of building was being carried on in Colombo, Kandy, Hatton, Talawakelle, Dimbula and other places.

Mr. Senanayake asked if other estates also built bungalows for their Superintendents at similar cost.

The Chairman replied that the Bungalows now being erected on St. Coomb's were all on the same lines as a bungalow recently built on a neighbouring estate.

Major Nicholson said that recently his agency had bulit a Superintendent's Bungalow costing Rs. 50,000/-.

Mr. Ferguson said that he had 32 years' experience in Dimbula and he considered it impossible to build an entirely new Bungalow inclusive of site cutting, etc., at present rates for less than Rs. 45,000/- to Rs. 50,000/-.

Mr. Bickmore asked if this was the case with regard to the Junior Scientific Staff Bungalows as far as prices were concerned.

The Chairman said that in this too the Institute had been guided by Mr. Ferguson.

Mr. Villiers said that it must be remembered that Rs. 41,330/- included drainage, lighting, etc. At one time he was strongly against spending so much on Bungalows but he had now come to the conclusion that the costs were reasonable.

Mr. Senanayake said that in view of the remarks made he was satisfied.

The Chairman extended an invitation to all the Members of the Board to visit St. Coomb's Estate.

He also announced that His Excellency the Governor had very kindly consented to visit the Estate in February.

Major H. Scoble Nicholson proposed the adoption of the Estimated Expenditure as presented for 1930, subject to any revision necessary in regard to final figures for 1929.

This was seconded by Mr. John Horsfall and carried.

(The Estimates revised in accordance with Major Nicholson's proviso are contained in Appendix A).

(c) *Additional Expenditure sanctioned by the Chairman.*—The following items sanctioned by the Chairman were confirmed:

1. Rs. 153/- for the transport of the Superintendent's effects from Bandarawela to Talawakelle.

2. Rs. 335/- for telephone extension from the Superintendent's Bungalow to the Clerk of Works' Quarters.

3. Rs. 2,000/- for scaffolding for the Laboratories and the Bungalows.

4. Rs. 186/- for Furniture for the Clerk of Works. To be subsequently used in the Junior Staff Bungalows.

5. Rs. 3,500/- for 30 temporary lines for the Contractor's labour.

IV.—MEMBERS OF THE BOARD

The following changes since the last meeting were recorded:

Mr. John Horsfall returned from leave in October and relieved Mr. C. C. du Pré Moore. A vote of thanks to Mr. C. C. du Pré Moore for his services was recorded.

Mr. R. G. Coombe returned from leave in November and relieved Mr. C. H. Wilkinson who had acted for him. Mr. Coombe resumed the Chair as from the 28th November, 1929. A vote of thanks to Mr. Wilkinson was recorded.

The Hon'ble Mr. J. W. Oldfield and Mr. J. D. Finch Noyes proceeded on leave in November and Major H. Scoble Nicholson and Mr. C. H. Figg had been appointed to act for them. A letter had that day been received from Mr. Figg saying that he had to go Home on urgent business and it was necessary for him to resign his appointment on the Board.

The Chairman welcomed Major H. Scoble Nicholson.

Mr. T. B. Panabooke returned from leave in December and relieved Mr. M. B. Galagoda who was acting for him. A vote of thanks was recorded to Mr. Galagoda for his services.

Mr. D. S. Cameron is due to go on nine months' leave as from the 1st April, 1930.

V.—BUNGALOWS

(a) *Senior and Junior Scientific Staff Bungalows.*—Commenting upon the Architect's Reports Nos. 8 and 9 sent to each member under cover of Circular No. A 33/29, dated the 25th November and Circular No. B. 1/30, dated the 9th January, 1930, the Chairman mentioned that the contract time for the completion of these bungalows was one year from the 1st January, 1930. Neither the Director nor himself were satisfied with the progress made with the Senior Staff Bungalows and were taking up the matter with the Architect.

Regarding the Junior Scientific Staff Bungalows, one Bungalow was roofed and should be ready for occupation by Mr. Tubbs soon after his arrival.

The Board confirmed the Chairman's action in having allowed, on the Architect's suggestion, a teakwood screen costing Rs. 150/- in each of the Senior Scientific Staff Bungalows.

(a) *Superintendent's Bungalow.*—The Chairman announced that the Superintendent was now in occupation of his Bungalow and that all the defects had been attended to.

VI.—ST. COOMB'S ESTATE

(a) *Visiting Agent's Third and Fourth Reports.*—The Chairman announced that the Visiting Agent's Third and Fourth Reports had been sent to each member under cover of Circulars No. A. 29/29, dated the 30th September, 1929, and No. B. 4/30, dated the 15th January.

Both reports were satisfactory and shewed that distinct progress was being made.

Mr. W. Coombe proposed and Mr. Villiers seconded that the whole of the Fourth Report should be published *en bloc* in the Minutes.

It was suggested and agreed that any portion of the Fourth Report could be made use of for the information of those whom the Board represented.

Mr. Senanayake said that the reason for his asking for the Reports to be published was because he thought that other estates might like to adopt some of the suggestions contained in the Reports, and he felt confident that Mr. Ferguson's Reports would be of great interest to many planters.

Mr. Ferguson said that he had not the slightest objection to his Report being published and he stood by everything he had written.

It was also decided that the Fourth Report for 1929 should be embodied in the Minutes and offered for publication in *The Tropical Agriculturist.* (Report is contained in Appendix B).

(b) *Acreage of St. Coomb's.*—Messrs. Julius and Creasy reported that the transfer deeds do not give the details of the area of tea or patna, but merely the total area of the Estate, viz: 415 acres, 3 roods, 12 poles. The recent survey shewed 423 acres, 2 roods, 12 poles.

The Chairman stated that when the buildings were completed another survey of that part of the estate on which the buildings are situated would be necessary.

(c) *Water Supply.*—The Director reported that the Government Sanitary Engineer was engaged in drawing up a scheme. It was estimated that 20,000 gallons per diem would be required. There are two sources of supply yielding approximately 35,000 gallons per diem. The main source would be a gravity supply but unfortunately it might prove to be polluted. If so a suitable filter might be necessary, but the action to be taken would depend on Mr. Dyer's Report.

The Board confirmed the Chairman's action in allowing Rs. 1,888/68 for piping, etc., for the temporary water supply and Rs. 800/- for Mr. Dyer's fee. The materials would subsequently be used in the permanent supply.

(d) *Rifle Range.*—At the last Meeting it had been decided to consult the legal advisers in this connection. Their reply was sent to each member of the Board under cover of Circular No. A. 39/29, dated the 10th December, 1929.

The Director reported that at the Chairman's request he examined both sites with the Superintendent and of the two sites in question the present one was to be preferred. There is no work going on in the immediate neighbourhood. Due notice was always given before firing and guards are stationed in various places to keep people out of danger. There would be a certain amount of annoyance just below the Superintendent's Bungalow, but that was only once a month.

The Chairman said that it would be necessary to close the existing range when extending the area in tea. There was a possibility of the subordinate quarters coming in the way of the proposed new site, in which case the Institute would have to oppose it.

Mr. Bickmore said that as far as Government was concerned they would have to provide at least Rs. 2,000/- for a new range for the Ceylon Defence Force if the existing range was closed.

Mr. Senanayake said that he was still opposed to having a rifle range in the neighbourhood of the Estate.

(e) *Clerk of Works.*—The Chairman said he gathered from the correspondence he had seen that Mr. Senanayake appeared to think that particulars with regard to a candidate suggested by the Director of Public Works had been withheld from the Board. Circular No. A. 24/29 dated the 24th August, 1929, had been sent to each member of the Board. This Circular stated that the Director of Public Works had suggested Mr. C. Subramaniam on a salary of Rs. 2,000/- per annum. He was 33 years of age and was in receipt of a salary of Rs. 1,700/- with 15% House Allowance.

The Chairman then read a letter from the Director of Public Works and added that this shewed that no information had been withheld.

Mr. Bickmore said that the Colonial Treasurer, Sir Wilfred Woods had written that the appointment should carry a salary of Rs. 9,000/- per annum.

Major Nicholson said that he had considerable dealings with Clerks of Works. They were very difficult to get and if efficient men were required they had to be paid reasonable salaries.

Mr. Senanayake said that it was not necessary that the man should be one with Engineering experience for the Institute's purpose. What was required was a man who was honest and did not work jointly with the Contractor. He therefore felt that the Board was not justified in spending this money.

The Chairman stated that the appointment having been made nothing further could be done.

(f) *House Allowance for the Superintendent.*—The Secretary read a letter dated the 23rd December, 1929, from the Visiting Agent suggesting that Mr. Rogers should be given house allowance for the nine months during which there was no bungalow on St. Coomb's.

Mr. Ferguson speaking in support suggested that the allowance be on the same lines as that of the Senior Scientific Officers.

It was decided that Mr. Rogers be given House Allowance for nine months, December, 1928 to August, 1929 at 15% of his salary, *i.e.*, Rs. 1,012-50.

This was agreed to.

(g) *Sand.*—The Chairman announced that a permit had been obtained for a further 500 cart loads of sand for the Buildings on St. Coomb's.

(h) *Green Leaf.*—The Chairman announced that owing to Troup Estate Factory having been burnt down the Superintendent had asked if the Institute could assist by either purchasing his green leaf or manufacturing his tea for a few months.

It was decided that the tea should be manufactured, the charge for so doing to be left in Mr. Ferguson's hands.

VII.—QUARTERS FOR THE SUBORDINATE STAFF

The Chairman reported that sites had been found for quarters for two Institute's clerks, six laboratory peons, five motor drivers and four married servants as recommended in the Director's Memorandum dated the 25th September, 1929.

VIII.—LABORATORIES

The Chairman reported that the contract time for the completion of the Laboratories was nine months to date from the 1st December, 1929. Rapid progress had been made and there appeared to be no reason why the buildings should not be completed in the contract time.

IX.—LEASE OF "LINDFIELD"

It was decided on the advice of the Director that arrangements should be made to renew the lease of "Linfield," and Mahagalla Bungalows until the end of 1930.

X.—FACTORY

The Chairman reported that manufacture commenced in October, 1929, and that the prices already obtained were very encouraging.

(a) *Electrical Spares.*—The Board concurred with the views of the Consulting Engineer and the Visiting Agent that it was unnecessary to purchase these for the present.

(b) *Inspection Report.*—It was decided to ask the Colombo Commercial Company to make the Inspection free of charge.

XI.—SENIOR SCIENTIFIC STAFF, T. R. I.

(a) *Passages.*—The Board confirmed the Chairman's action in having sanctioned Mrs. Norris' passage from England to Ceylon amounting to £66-0-0.

(b) *Annual Increments.*—The Chairman's action was also confirmed in having granted Mr. Eden, Agricultural Chemist, and Dr. Evans, Bio-Chemist, their annual increments of £40-0-0 per annum as from 1st October, 1929, and 25th November, 1929.

(c) *Entomologist.*—The Chairman reported that Mr. King's agreement had been altered to be in conformity with the rest of the Staff. Mr. King had arrived and had taken up his duties as from the 10th December.

(d) *Plant Physiologist.*—This Officer's agreement had also been altered to be in keeping with the rest of the Staff. Mr. Tubbs was expected to arrive in Ceylon on the 3rd March, 1930, and after a short time at head-quarters would proceed to St. Coomb's.

(e) *Mycological and Entomological Work*.—The Chairman stated that Circular No. B. 1/29, dated the 18th October, 1929, had been circulated with the result that it had been decided that Mr. Park, who had been in charge of the advisory Mycological work since Dr. Gadd's departure on leave and Mr. Jepson who had done the Entomological work from the 1st July until the arrival of Mr. King in December should each be given an honorarium of Rs. 150/- per mensem for these periods.

This was confirmed and the Secretary was instructed to thank the Department of Agriculture for assisting the Institute.

In reply to a question by Mr. Bickmore, the Chairman said that Government had granted permission for these Officers to accept the honoraria.

XII.—PROVIDENT FUND

(a) *Junior Scientific Staff*.—The question as to whether the Junior Scientific Staff should be allowed to join the Ceylon Planters' Provident Society, the employee contributing 5% and the employer a like amount was awaiting discussion by the C. P. P. S. Committee.

(b) *Subordinate Staff*.—It was decided that a separate account should be run in the Planters' Association office for the Subordinate Staff, the employee contributing 5% of his salary and the Institute 5% and they be given 5% of a year's salary as a Bonus at Christmas if earned.

XIII.—CHRISTMAS BONUS

The Chairman stated that as a result of Circular No. A. 40/29, dated the 16th December, the Board agreed by a majority of 8 to 1 to the payment of the Bonus amounting to Rs. 519-12 to the Junior Scientific Staff and the Subordinate Staff. The payment was confirmed.

Sir Wilfred Woods had opposed the Christmas Bonus being paid to the Junior Scientific Staff. It was pointed out that 1929 was the last year that the Bonus was being given to the Junior Scientific Staff.

Mr. Bickmore said that under these circumstances he agreed.

XIV.—ANNUAL REPORT

The Chairman said that the Secretary's portion of the Annual Report had been sent to each member of the Board under cover of Circular No. A. 38/29 of 10th December. The various alterations suggested by members had been incorporated.

This portion of the Report was adopted.

The Director reported that with the Chairman's approval he had arranged to hold up his portion of the report till about the middle of February to enable Dr. Gadd to write up the Mycological section on his return from leave shortly and Mr. King, who was at present going over the Entomological files, to write up the Entomological section, thereby making the Report more valuable.

This was agreed to.

XV.—MR. SENANAYAKE'S LETTER DATED THE 8TH JANUARY, 1930

Mr. Senanayake's letter dated the 8th January under cover of Circular No. B. 3/20, dated the 14th January, had been sent to each member of the Board. The Chairman said that the major points of Mr. Senanayake's letter had been dealt with but there was one point that he wished to discuss, and that was regarding the decision of important matters by mere circulation of papers.

Mr. Senanayake said that if a member wished a subject that was being circulated brought up at a Meeting, it should be done.

The Chairman replied that this procedure had always been adopted by him and the subject put on the Agenda of the next Meeting. By circulation of papers he often received well-thought-out and sound ideas which were of the greatest assistance to him.

Mr. W. Coombe said that Mr. Senanayake's idea that the Institute wished to keep out Ceylonese was a mistake.

Mr. Senanayake said that he was glad that this point was raised as he honestly felt that it would have been better if Ceylonese were not on the Board.

Mr. W. Coombe said that this was not the case and that the Board wanted to employ Ceylonese as well as to have them on the Board.

Mr. Senanayake said that with regard to the appointments on the Scientific Staff, the Institute got men from outside Ceylon, but Ceylonese, however well they were qualified stood no chance of getting a job in the Institute, on the ground of inexperience and that an opportunity should be given to train these young men.

Mr. Coombe enquired if later on it might not be possible to start classes at St. Coomb's for giving experience to Ceylonese fresh from School.

The Director said that it would take up a considerable amount of the Staff's time to train lads fresh from school but in the case of men with a Science Degree facilities could probably be arranged for them to acquire practical experience, but the Institute could not guarantee their employment.

Mr. Senanayake said that although it was more or less easy for young men to obtain degrees, there appeared to be nowhere in Ceylon for them to gain the necessary experience. He quite realised that it was impossible to guarantee employment, but if arrangements such as outlined by the Director could be made, he would be satisfied.

The Chairman said that he agreed with Mr. W. Coombe in that it was a wrong impression that the Institute wished to exclude Ceylonese.

XVI.—VISITORS' DAY.

The Chairman mentioned that the first Wednesday of each month had been fixed as Visitors' Day and a circular had been sent to this effect to all District Planters' Associations. Visitors at other times would be welcome but it would not be possible to offer the same facilities as on Visitors' Day.

XVII.—VISIT OF THE SCIENTIFIC STAFF AT TOCKLAI.

The Chairman announced that the Institute hoped to have its Second Conference next year and that he hoped that Mr. Carpenter and some other members of the Scientific Staff at Tocklai and South India would be able to attend.

XVIII.—EMPIRE MARKETING BOARD.

In a letter dated the 5th January, the Hon'ble Mr. J. W. Oldfield wrote that he hoped to see the Secretary of the Empire Marketing Board shortly.

XIX.—PUBLICATIONS.

The Chairman's action in having increased the number of Publications to 1,500 copies was confirmed.

XX.—SECRETARY'S LEAVE

It was decided that the Secretary should be given full pay during his furlough and also a bonus of Rs. 1,000.

The Meeting terminated with a vote of thanks to the Chair.

A. W. L. TURNER,
Secretary.

Appendix A

THE TEA RESEARCH INSTITUTE OF CEYLON

ESTIMATED EXPENDITURE, 1930

	Rs. c.	Rs. c.
Estate Expenditure Revenue	85,749 50	
Capital	17,899 50	
		103,649 00
RESEARCH ACCOUNT—REVENUE		
Administration of the Board	15,575 00	
Personnel Emoluments of Scientific Staff ...	89,725 00	
Laboratories	36,384 00	
Field and Factory Experiments ...	2,000 00	
Laboratory Offices	3,372 00	
Travelling of Staff	6,184 00	
Contingencies	7,613 00	
Maintenance of Roads, Bridges, etc. ...	1,095 00	
Sundries shared with Estate	672 00	
		162,620 00
RESEARCH ACCOUNT—CAPITAL		
Laboratories.—Adams & Small's Estimate	170,800 00	
Extras	27,100 00	
		197,900 00
Bungalows.—4 Senior Scientific Staff ...	165,320 00	
Plus 10% ...	16,532 00	
	181,852 00	
Less paid on Certificate No. 1	4,000 00	
		177,852 00
4 Junior Scientific Staff ...	44,000 00	
Plus 10%	4,400 00	
	48,400 00	
Less paid on Certificate No. 1	6,000 00	
		42,400 00
Insurance—		300 00
Furniture—		
4 Senior Staff Bungalows @ Rs. 4,375/-	17,500 00	
4 Junior Staff Bungalows @ ,, 1,375/-	5,500 00	
2 Clerks @ ,, 300/-	600 00	
Entomologist	1,000 00	
		24,600 00

Other Buildings—			
2 Clerks' Houses	@ Rs. 5,000/-	10,000 00	
6 Peons' Quarters	@ ,, 700/-	4,200 00	
5 Drivers' Quarters	@ ,, 1,300/-	6,500 00	
4 Servants' Quarters	@ ,, 700/-	2,800 00	
Telephone Service	... ...	4,500 00	
Manure Shed	... ...	2,000 00	
Latrines	... ...	1,500 00	
			31,500 00
Electricity	... ...		1,900 00
Roads	... ...		1,000 00
Water Supply	... ...		10,000 00
Temporary Lines	... ...		3,500 00
Contingencies	... ...		5,000 00
Clerk of Works	... ...		8,400 00
Government Loan	... ...		78,227 00
	TOTAL 1930 ...		Rs. 848,848 00

NOTE—Additions to original Estimates are as follows:

Under Estate Revenue Account Rs. 1,012-50, Superintendent's House Allowance sanctioned 27th January, 1930.

Under Laboratories Rs. 4,500/- Nettle Grub Assistant, 1931, sanctioned 27th January, 1930.

ESTIMATED EXPENDITURE, 1931

	Rs. c.	Rs. c.
ESTATE EXPENDITURE		
Revenue—	91,000 00	
Capital—	20,000 00	
		111,000 00
RESEARCH ACCOUNT		
Revenue—		
Administration of the Board ...	15,575 00	
Personnel Emoluments of Scientific Staff.	86,459 00	
Laboratories	42,084 00	
Field & Factory Experiments ...	2,000 00	
Laboratory Offices	3,794 00	
Travelling of Staff	6,274 00	
Contingencies	8,445 00	
Maintenance of Roads, etc. ...	4,500 00	
Sundries shared with Estate ...	1,282 00	
		170,413 00
CAPITAL		
Bungalows—		
2 Junior Staff Bungalows	22,000 00	
Plus 10%	2,200 00	
		24,200 00
Furniture—		2,750 00
Other Buildings—		
Dhoby House		3,200 00
Government Loan		78,227 00
	Rs.	389,790 00

NOTE—Addition to original Estimate Rs. 4,500/- "Laboratories," Nettle Grub Assistant.

ESTIMATED EXPENDITURE, 1932

	Rs. c.	Rs. c.
ESTATE EXPENDITURE		
Revenue—	91,000 00	
Capital—	20,000 00	
		111,000 00
RESEARCH ACCOUNT		
Revenue—		
Administration of the Board	14,575 00	
Personnel Emoluments of Scientific Staff	90,209 00	
Laboratories	36,829 00	
Field & Factory Experiments ...	2,000 00	
Laboratory Offices	3,994 00	
Travelling of Staff	6,570 00	
Contingencies	6,216 00	
Maintenance of Roads, etc. ...	5,000 00	
Sundries shared with Estate ...	1,282 00	
		166,675 00
CAPITAL —		
Bungalows—		
1 Senior Staff Bungalow	41,330 00	
Plus 10%	4,133 00	
		45,463 00
Furniture	4,375 00	
Less spent in 1930	1,000 00	
		3,375 00
2 Junior Staff Bungalows	22,000 00	
Plus 10%	2,200 00	
		24,200 00
Furniture	2,750 00	
Other Buildings—		
1 Servant's Quarter	700 00	
1 Peon's Quarter	700 00	
1 Driver's Quarter	1,300 00	
Government Loan	78,227 00	
	Rs.	434,390 00

ESTIMATED EXPENDITURE, 1933

ESTATE EXPENDITURE		
Revenue—	91,000 00	
Capital—	20,000 00	
		111,000 00
RESEARCH ACCOUNT		
Revenue—	172,000 00	
		172,000 00
CAPITAL		
Bungalows—		
1 Senior Staff Bungalow ...	41,330 00	
Plus 10%	4,133 00	
		45,463 00

Furniture—		4,375 00
1 Junior Staff Bungalow	11,000 00	
Plus 10%	1,100 00	
		12,100 00
Furniture—		1,375 00
Other Buildings—		
1 Servant's Quarters		700 00
Government Loan		78,227 00
Total ... Rs.		425,240 00

ESTIMATED EXPENDITURE, 1934

ESTATE EXPENDITURE		
Revenue—	91,000 00	
Capital—	20,000 00	
		111,000 00
RESEARCH ACCOUNT		
Revenue ...		175,000 00
Capital—		
Bungalows—		
1 Junior Staff Bungalow	11,000 00	
Plus 10%	1,100 00	
		12,100 00
Furniture—		1,375 00
Government Loan		78,227 00
Total ... Rs.		377,702 00

ESTIMATED RECEIPTS AND DISBURSEMENTS

Balance cash as at 31-12-29		504,298 00
ESTIMATED INCOME 1930 :		
Tea Cess	225,000 00	
Tea Sales 120,000 lbs. @ 95-30 ...	114,360 00	
Interest	10,000 00	
		349,360 00
		853,658 54
Expenditure 1030 as per Statement ...		848,848 00
Balance in hand as at 31-12-30 ...		4,810 54
ESTIMATED INCOME 1931 :		
Tea Cess	225,000 00	
Tea Sales	120,000 00	
		345,000 00
		349,810 54
Expenditure 1931 as per Statement ...		389,790 00
Approximate shortfall as at 31-12-31 ...		39,979 46

ESTIMATED INCOME 1932:			
Tea Cess	225,000 00		
Tea Sales	125,000 00		
		350,000 00	
		310,020 54	
Expenditure 1932 as per Statement ...		434,390 00	
Approximate shortfall as at 31-12-32 ...		124,369 46	
ESTIMATED INCOME 1933:			
Tea Cess	230,000 00		
Tea Sales	130,000 00		
		360,000 00	
		235,630 54	
Expenditure 1933 as per Statement ...		425,240 00	
Approximate shortfall as at 31-12-33 ...		189,609 46	
ESTIMATED INCOME 1934:			
Tea Cess	235,000 00		
Tea Sales	135,000 00		
		370,000 00	
		180,390 54	
Expenditure 1934 as per Statement ...		377,702 00	
Approximate shortfall as at 31-12-34 ...		197,311 46	

A. W. L. TURNER,
Secretary.

Kandy, 18th February, 1930.

Appendix B

ST. COOMB'S ESTATE

INSPECTION REPORT

VISITED 4TH JANUARY, 1930

SUPERINTENDENT: MR. JOHN. A. ROGERS

ACREAGE STATEMENT

	A.	R.	P.
Tea in full bearing	165	0	16
Tea in partial bearing	4	0	00
New clearings	65	1	07
Fuel clearings	4	1	13
Reserve for planting, Waste land, Building sites	184	3	16
	423	2	16

CROPS

Estimate	1929	...	120,000 lb.	Made Tea
Secured to	31-12-29	...	103,257 lb.	Made Tea
Secured to	31-12-28	...	115,920 lb.	Made Tea
		Decrease ...	12,663 lb.	Made Tea

Yield per acre on 165 acres	To date ...	625 lb.
	Same date 1928 ...	703 lb.
	Same date 1927 ...	672 lb.

The season closes with a decrease of some 12,663 lb. less than the previous year. The principal reason for shortage being the climate conditions. The latter end of 1928 was exceptionally short of rainfall, and now we have for 1929 the shortest rainfall in Dimbula for 35 years.

Another reason which will not occur again, is that owing to hard plucking, the fields in their third year from pruning were played out, and ready for the knife six months before they were due.

RAINFALL

To 31-12-29 ...	76·12 inches.	No. of wet days	220.
To 31-12-28 ...	80·42 inches.	No. of wet days	192.
Decrease	4·30 inches.	Increase	28.

LABOUR

At the end of December the force consisted of :

Working Tamils	340	on Estate 463 coolies
Non-workers and Children	123	
At Coast	6	
Total	469	

Number of coolies recruited this season :

From India New Coolies ...	14 ...		
From India Old Coolies ...	10 ...		
Locally	123 ...		147
Number of coolies Paid off ...	33 ...		
Number of coolies Paid off to India ...	17 ...		
Died	1 ...		51
	Increase ...		96

The labour force during the year was in excess of our requirements for an Estate of our acreage, but we had to get through so much work for the Tea Research side that it was necessary to have a large number of labourers.

There was the usual trouble, when close supervision was brought to bear on the field works, but I am pleased to say, that Mr. Rogers handled his labour well, and that things are running smoothly, and labour more settled.

PLUCKING

Cost to 30-11-29. 13·80 Cents. Estimate. 14·50 Cents.

The work on the bushes still goes on improving but until all fields have been pruned once the full benefit of the more careful work will not be felt. The improvement to date is very marked.

PRUNING

Programme 1929, 68 acres to cost Rs. 12-00 per acre.

Completed to 31-12-69, 68 acres costing Rs. 14-54 per acre.

The programme was completed at rather over the estimate. This, however, could not be helped. More careful pruning had to be done, and once the whole Estate has been pruned the work will not be so costly.

The present system is to prune every three years, but it is my opinion that when we have the Estate in good order, there should be a return to two years' pruning cycle. At our elevation the tea in the last seven or eight months before pruning gets below par, and we not only lose crop but also quality, and the recovery after pruning is very slow, which points to the bushes being played out.

The plucking also becomes so expensive on fields such as No. 1.

CULTIVATION.

MULCHING PRUNINGS

Programme 1929. 68 acres to cost Rs. 4-00 per acre.

Completed to 30-11-29. 68 acres costing Rs. 2-82 per acre.

ARTIFICIAL MANURE.

Programme, 1929, 185 acres to cost Rs. 6-00 per acre.

Completed to 31-12-29, 185 acres costing Rs. 6-32 per acre.

MIXTURE APPLIED.

	Pruning Mixture	2nd year Mixture	3rd year Mixture
Groundnut Cake ...	160 lb.	150 lb.	250 lb.
Blood Meal ...	50 lb.	50 lb.	00 lb.
Sulphate of Ammonia ...	80 lb.	50 lb.	100 lb.
Nitrate of Potash ...	50 lb.	00 lb.	00 lb.
Ephosphosphate ...	220 lb.	00 lb.	00 lb.
Muriate of Potash ...	40 lb.	00 lb.	50 lb.
Whale Guano ...	00 lb.	250 lb.	50 lb.
Steamed Bone meal ...	00 lb.	100 lb.	00 lb.
Sulphate of Potash ...	00 lb.	50 lb.	00 lb.
Total ...	600 lb.	650 lb.	450 lb.
Containing			
Nitrogen ...	37·70 lb.	46·50 lb.	34·50 lb.
P'Acid ..	59·40 lb.	42·00 lb.	20·00 lb.
Potash ...	36·50 lb.	24·00 lb.	25·00 lb.

Cultivation has been carried out as per estimate. The work was carefully done, the best use being made of what Mulch there was. It is early yet to say what the results will be, but I have confidence that the cultivation is on sound lines.

WEEDING

Spent to 30-11-29 Rs. 5,463-70, cost per lb. Cts. 5·72 per acre Rs. 2-68.

Estimate, 1929 Rs. 4,440-00, cost per lb. Cts. 3·70, per acre Rs. 2-00.

Weeded on Estate Account 2,035 acres.

The whole Estate is in good order and will, I feel sure, remain so. The extra cost is due to Mr. Rogers having to take the whole acreage over on estate account. When the Estate is in thorough order, the contracts will be given out again and the cost will be reduced.

ROADS AND BRIDGES

Spent to 30-11-29 Rs. 507-00 Estimate Rs. 1,155-00.

This refers to the Mattakellie Road from the main Government road to the St. Coomb's boundary. The work of putting this road in good repair is now being carried through, but owing to the lack of favourable weather the work has not been completed.

DRAINS

Spent to 30-11-29 Rs. 696-84 Estimate Rs. 756-00.

Are all in order. In the pruned fields extra work has been done recutting and opening out the old drains.

RAVINES AND BOUNDARIES

Spent to 30-11-29 Rs. 501-39 Estimate Rs. 540-00.

There is much still to be done before it can be said, that the ravines are in good order. Progress has, however, been made, and it only needs a little more time and labour.

GREEN MANURE

Spent to 30-11-29 Rs. 336-59 Estimate Rs. 895-00.

The year has not been a very favourable one for the supplying of Dadaps, but what have been planted are making fair progress. Where there are Dadaps much has been done to regulate the shade and get them under control. All loppings were forked into the soil.

PESTS AND DISEASES

Spent to 30-11-29 Rs. 1,826-17 Estimate Rs. 996-00.

This item is much overspent, is due to the very bad state in which No. 1 field was found after pruning.

Being a low jât field the work of getting ferns out was most difficult. I doubt if it was ever done before. The rooting out of old Grevillea stumps is done in all fields pruned.

Illuk Grass which was bad in all fields has been cleaned up in all fields pruned since the Estate was taken over. There is still, however, a good deal to be done.

Since my last visit there has been a slight attack of Tortrix.

MANUFACTURE

Cost to 30-11-29 14·30 Cents. Estimate 9·50 Cts.

PERCENTAGES OF GRADES TEA

B. O. P.	... ...	33·06%
B. P.	... ...	24·62%
O. P.	... ...	3·98%
Pekoe	... ...	25·62%
Fannings	... ...	11·23%
Dust	... ...	1·49%
	Total	100·00%

Manufacture has been started in our own Factory, and I was agreeably surprised at the quality of Teas turned out. We had no complaints of tainted Tea from oil or Jute Hessian.

Things are not yet quite straight, and the coolies have yet to be trained in their work, but I feel sure St. Coomb's will turn out very good Tea when we get properly under way.

Percentages and Cost convey very little for the present, as so little of our crop was made in our Factory.

CAPITAL ACCOUNT

NURSERIES. Spent Rs. 7,737-92 Estimate Rs. 7,004-00.

There have been 30 Maunds of seed put out in the Nurseries and these are coming away well. Later in the year the application of a small dose of Nursery Mixture would, I think, be beneficial. The surface soil on the patna land is not too rich.

NEW CLEARINGS

Spent to 30-11-29 Rs. 13,103-12 Estimate Rs. 13,908-00.

Since my last visit the clearings have been forked and had the application of special Artificial Mixture.

The improvement is so marked (even after such a short period) that it can only be regretted, that the clearings were not forked when opened.

The supplies put in this year are looking very well, and as we are getting some useful rain now, it is to be hoped the planting will prove a success.

FACTORY

Spent to 30-11-29 Rs. 128,580-35 Estimate Rs. 110,525-00.

The building has been completed, and is a very fine piece of work. There are still the finishing touches to be done to improve the appearance, such as putting a coat of whitewash or Distemper on the walls in rolling room and the painting of the roof.

There is difficulty in cleaning up inside until such time as our store rooms are built, and there is a lot of materials lying about.

MACHINERY

Spent to 30-11-29 Rs. 98,492-27 Estimate Rs. 126,653-00.

The machinery was running satisfactorily. The Engines have been erected with the greatest efficiency, and the Electrical part of the job is one which I do not pretend to know much about, but from the finish of the work, and the ease with which the Factory is run, I should say it is all very excellent. There are a few minor defects in the Factory which will no doubt be rectified. I find too much oil, being thrown from the bearings of Driers, and Packer, which is dangerous in a Tea Factory.

GENERAL

Being the final visit for 1929, it may not be out of place, to give a short review of the progress made during the year.

On the field the programme as drawn up was carried through, and the work done was given every attention under very difficult conditions, but I can truly say, that progress of bringing the property into first class order has well advanced.

It must be remembered that there was no Clerk of Works, and that the whole burden of the work, both of the Estate and Research side, was carried through by the Superintendent. During the year the following works were carried out in addition to routine works:

BUILDINGS

Factory Site cut and Factory built.

Packing Material Shed site cut out and building erected.

Engine Room	do	do
Pump House	do	do
Rice Store	do	do
School House	do	do
Estate Office	do	do
Superintendent's Bungalow	site cut out	do
Line Rooms 30	site cut out and	do
Latrines 12	do	do
Tea Maker's Bungalow	do	do

Tea Reasearch Institute Senior Bungalows (4) site cut.

Do	Junior	do	(4)	do
Do	Laboratory			do

ROADS

Mattakellie Cart Road remetalled one mile.

Estate Cart Road remetalled ¾ mile.

Estate Path converted to Cart Road one mile.

Estate New Road cut and metalled 10 Chains.

BRIDGES

Two erected over swamp and stream.

The above will give a very clear idea of the amount of work Mr. Rogers has carried through, and under most trying conditions. I have always found Mr. Rogers anxious to help in every way, and he has the best interest of the Institute at heart.

(Sgd.) J. W. FERGUSON.

St. Clair Group,
Talawakelle,
8th January, 1930.

DEPARTMENTAL NOTES

PROGRESS REPORT OF THE EXPERIMENT STATION, PERADENIYA

FOR THE MONTHS OF JANUARY AND FEBRUARY, 1930

TEA

OWING to the pruning having been started at the beginning of September instead of the beginning of October and to the north-east monsoon having lasted a month longer than is usual, the casualties sustained after pruning have been much fewer than usual.

The writer is of the opinion that October is at Peradeniya one of the worst months to prune tea and recommends that when the present trial of *Indigofera* has been allowed to run for another two-year period the time of pruning should be re-considered.

The results of the *Indigofera* trial to date have been written up and submitted for publication in *The Tropical Agriculturist*. The Agricultural Chemist has submitted a separate article on the analytical side of the question.

RUBBER

A complete round of brown bast treatment has been completed. The treatment of each tree is recorded in order that the recurrence of the disease on the same trees may be studied at a later date.

A short article has been submitted for publication in *The Tropical Agriculturist* giving information as to the effects to date of the different methods of tapping to death adopted in the rejuvenation experiment.

COFFEE

A bulletin entitled "The Cultivation and Commercial Possibilities of the Robusta Types of Coffee" has been submitted for publication.

CACAO

Lopping of shade is in progress and a round of pruning was started in February. Owing to pressure of other work pruning this year is being limited to the removal of suckers and dead wood.

A round of bark canker-treatment by light scraping and painting with 10 per cent. brunolinum was started in February.

Manures were applied to the plots under manurial experiment according to plan in January. This experiment terminates in April, 1931.

FODDER GRASSES

All the old fodder grass plots received an application of cattle manure at the rate of 20 cart loads per acre in February.

The coconuts in these plots are now occupying more space and it is intended to gradually transfer all fodder grasses to the other end of the station nearer the cattle sheds. The area known as the Panchikawatte paddy fields is not now used by the Economic Botanist and is available for planting in fodder grasses. A part of the area was planted in January and further planting will be done in the south-west monsoon.

CINCHONA

Plants of *Cinchona robusta* and *Cinchona ledgeriana* from Hakgala were planted in plot 25 in June-July, 1929. The present position is as follows :

	Alive	Dead
Cinchona robusta	16	11
Cinchona ledgeriana	77	10

ATLAS TREEKILLER

This trial has been concluded and the following report was sent to Messrs. Lee, Hedges & Co., Ltd., Colombo :

Tree No. 1.—Three holes bored by augur and *Treekiller* poured in on October 16th, 1929.

October 22nd, 1929.—The top of the tree had started to wither, middle branches still healthy.

November 20th, 1929.—More branches were dying but the tree was still apparently healthy more than half way up.

December 27th, 1929.—All branches were dead. The tree was still green at the bottom but was apparently dying.

January 29th, 1930.—The trees was dead to the roots.

Tree No. 2.—A strip of bark about 6 inches wide removed from the tree and the *Treekiller* painted on on October 16th, 1929.

October 22nd, 1929.—The appearance of the tree was much the same as that of tree No. 1 on the same date.

November 20th, 1929.—The tree was completely dead right down to the roots.

Tree No. 3.—Control. A strip of bark was removed in the same way as from tree No. 2 but no *Treekiller* was put on. The tree remained healthy throughout.

As far as can be seen from a small experiment with only one tree for each treatment the method employed on tree No. 2 seems to kill a sapu tree in about a month while that employed on tree No. 1 takes about three months.

VISITS TO ESTATES

Visits were paid to the following estates : Silver Hill and Mattakelly in connection with coffee, Talankande and Annfield in connection with leguminous plants, and Middleton to see a tea clearing planted in contour hedges.

THE IRIYAGAMA DIVISION

During January *Centrosema pubescens* was sown on the banks of the terraces in area 6—the area planted with foreign clones. The mixture of leguminous bush plants sown in this area had not proved effective in checking erosion.

The following table shows the number of buds that have actually sprouted in these imported clones in area 6:

Clone	Date of planting	Number of plants	Number sprouted on 31-12-29	Number sprouted on 28-2-30
Tj 1	29-10-29	60	46	55
Tj 8	29-10-29	60	24	47
Tj 16	9-11-29	60	6	33
BD 5	12-10-29	60	24	46
AVROS 49	12-10-29	60	22	49
AVROS 50	12-10-29	60	15	43
SR 9	21-11-29	60	19	47
H 2	21-11-29	60	29	53

Eleven vacancies were supplied in February and these have been watered.

The extending of this clearing is in progress to accommodate the remainder of foreign clones selected for testing.

The following stumps were received on 24th January, 1930 to replace failures in a previous consignment:

AVROS	50	...	12
AVROS	49	...	5
BD	5	...	19

These were planted in a nursery.

An area of waste land at the end of the nurseries has been allotted for cooly gardens.

Tenders have been invited for the erection of another 10-room set of permanent lines.

T. H. HOLLAND,
Manager,
Experiment Station,
Peradeniya.

ANIMAL DISEASE RETURN FOR THE MONTH ENDED 31st MARCH, 1930

Province, &c.	Disease	No. of Cases up to Date since Jan. 1st 1930	Fresh Cases	Recoveries	Deaths	Balance Ill	No. Shot
Western	Rinderpest	277	150	34	199	16	28
	Foot-and-mouth disease	153	71	138	10	5	...
	Anthrax	...	...	...	...	...	...
	Piroplasmosis	...	...	...	...	...	...
	Rabies. (Dogs)	...	...	...	...	...	...
Colombo Municipality	Rinderpest	..	...	...	...	...	...
	Foot-and-mouth disease	416	217	296	8	111	1
	Anthrax	1	1	...	1	...	...
	Haemorrhagic septicaemia	3	1	...	3	...	...
	Black Quarter	2	...	...	2	...	...
	Rabies (Dogs)	7	2	...	...	...	7
Cattle Quarantine Station	Rinderpest	..	...	...	...	...	...
	Foot-and-mouth disease	...	..	...	...	...	...
	Anthrax (Goats)	168*	104	...	168	...	...
Central	Rinderpest	...	..	...	...	...	...
	Foot-and-mouth disease	497	99	359	2	136	...
	Anthrax	...	...	...	...	...	...
	Rabies (Dogs)	1	...	...	...	...	1
	Haemorrhagic septicaemia	...	..	...	...	...	...
Southern	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	259	71	239	6	14	...
	Anthrax	...	...	...	...	...	...
Northern	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	1779	991	1709	70	...	...
	Anthrax	...	...	...	...	...	...
Eastern	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	88	...	86	2	...	...
	Anthrax	...	...	...	...	...	...
North-Western	Rinderpest	2767	627	50	2102	12	603
	Foot-and-mouth disease	4	1	3	...	1	..
	Anthrax	...	...	...	..	...	...
	Piroplasmosis						
North-Central	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	1069	...	905	24	140	...
	Anthrax	...	...	...	...	...	...
Uva	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	72	13	59	...	13	...
	Anthrax	...	...	...	...	...	...
	Haemorrhagic septicaemia	...	...	..	...	...	...
Sabaragamuwa	Rinderpest	43	18	5	38	...	...
	Foot-and-mouth disease	1033	172	806	7	220	...
	Anthrax	...	...	...	...	...	...
	Haemorrhagic septicaemia	8	..	..	8	...	...

* 1 case in a buffalo

G. V. S. Office,
Colombo, 9th April, 1930.

G. W. STURGESS,
Government Veterinary Surgeon.

METEOROLOGICAL REPORT

MARCH, 1930

Station	Temperature				Humidity		Amount of Cloud	Rainfall		
	Mean Maximum	Difference from Average	Mean Minimum	Difference from Average	Day	Night (from Minimum)		Amount	No. of Rainy Days	Difference from Average
	°	°	°	°	%	%		Inches		Inches
Colombo	88·8	+0·9	74·1	+0·8	68	93	6·4	2·67	7	— 2·15
Puttalam	89·3	+0·5	73·0	+0·6	67	93	5·0	2·42	4	— 0·55
Mannar	90·7	+0·8	74·9	+0·2	66	90	6·6	0·89	2	— 0·60
Jaffna	88·2	+0·5	76·1	+0·1	70	88	5·4	0·63	2	— 0·55
Trincomalee	85·4	—0·6	76·4	+0·6	74	86	4·4	2·36	5	+ 0·60
Batticaloa	86·1	+0·3	75·2	+0·2	75	93	5·4	0·43	5	— 2·76
Hambantota	86·2	—1·0	73·7	0	75	93	4·5	6·07	13	+ 3·55
Galle	86·0	—0·2	75·1	+0·1	76	91	5·9	8·54	12	+ 3·87
Ratnapura	92·0	+2·0	73·0	—0·2	70	93	6·0	10·23	23	+ 1·25
A'pura	90·5	—1·9	72·0	+0·6	64	95	7·2	7·79	7	+ 4·91
Kurunegala	91·9	—1·0	70·7	+0·8	64	93	6·6	5·46	7	+ 0·22
Kandy	87·4	+0·6	68·9	+0·8	68	92	5·6	10·39	10	+ 6·30
Badulla	82·4	—0·1	64·6	+1·1	70	94	5·4	4·38	11	— 0·30
Diyatalawa	77·9	+1·6	56·4	—1·5	66	88	6·4	5·13	8	+ 0·79
Hakgala	74·7	+1·3	53·0	+1·5	68	88	5·1	4·35	9	— 1·23
N'Eliya	71·4	+0·3	46·4	+0·5	64	90	6·4	2·25	9	— 1·28

The rainfall of March did not differ greatly from normal, and at more than half the stations the month's figures were within 2 inches of their average. The chief areas in which the rainfall was appreciably more than 2 inches above average were in the centre of the Southern Province, in the Pussellawa district, and near the Southern limit of the main hills. One or two stations further North showed the same thing, *e.g.*, Kandy and Anuradhapura, but in these cases the distribution was more erratic, a natural result in a month like March, in which local thundershowers are one of the chief sources of rain.

Deficits were rather more frequent, and exceeded 5 inches in the Rangalla district and at a few stations in the Kelani Valley. Cases of deficits of between 2 and 5 inches were common in the W.P., N.W.P., Sab., Uva and the E.P.

The highest total for the month was 23·58 inches at Urubokka, which station also recorded the highest figure for 24 hours, viz., 5·80 inches on the 26th. Other stations with over 20 inches were Anningkande and Morawaka.

Temperatures were on the whole above average, but the excess was was decidedly more marked in the case of those by night, than those by day, a fact that is the natural concomitant of the amount of cloud having been above average at almost all stations.

Pressure was consistently below the March average. As the average pressure shows successive decrease from January to June, this fact may be regarded as an indication that the season is ahead of, rather than behind its normal time-table, a suggestion which received some support from the figures for duration of sunshine.

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